ELECTRICAL TIMES

THURSDAY
8 FEB.
1951
SIXPENCE

BICC 3·3kV three-core Mass-Impregnated Non-Draining Cable

British Patent No. 581830 (Also patented in Australia, Canada, India, and South Africa. U.S. Patent applied for.)

Here's a BICC cable designed for vertical runs and steep gradients. The compound *will not migrate* even when the cable is operating at maximum working temperature, and the paper insulation remains fully and uniformly impregnated.

BICC Mass-Impregnated Non-Draining Cables have been developed for voltages up to 11kV, specially for use in mine shaft feeders, rising mains and indoor situations. Sheaths may be of lead, lead alloy or aluminium.

NO COMPOUND MIGRATION IN THIS CABLE

Further information is given in Publication No. 280V available on request.

B.I. Callender's

Mass-Impregnated Non-Draining Cables

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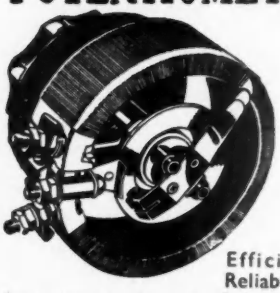

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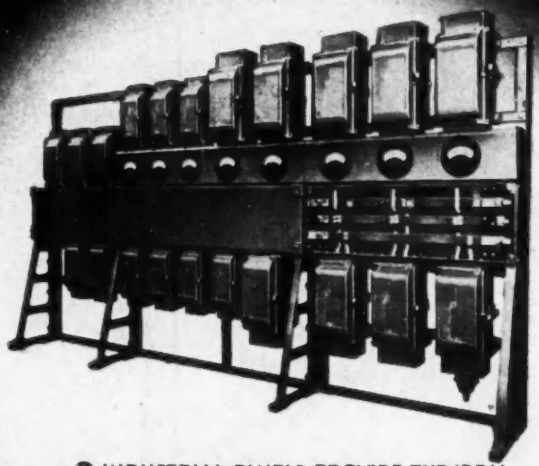

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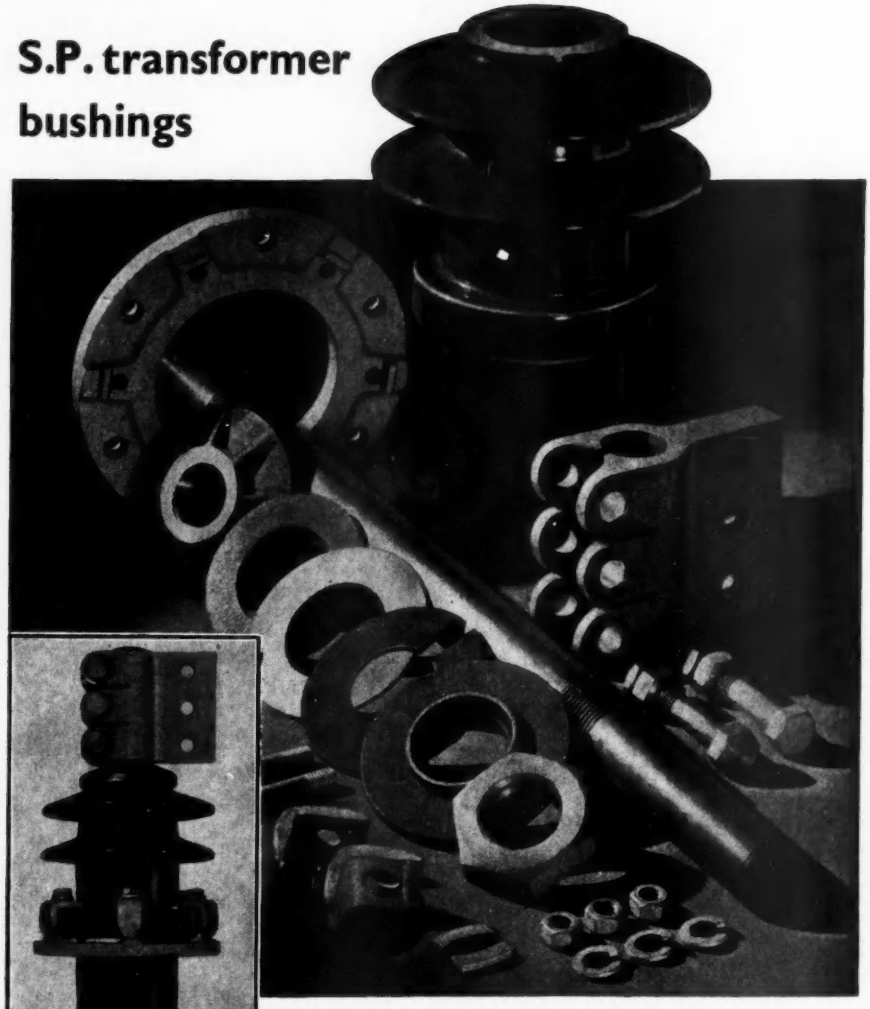

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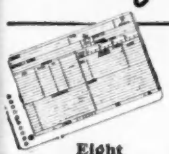

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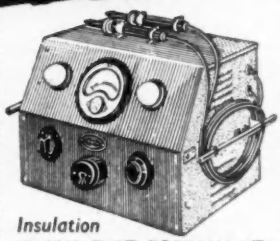

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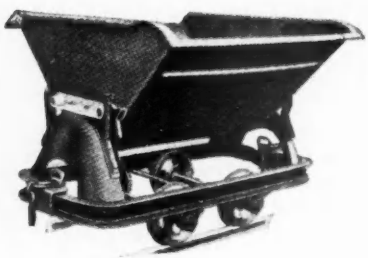

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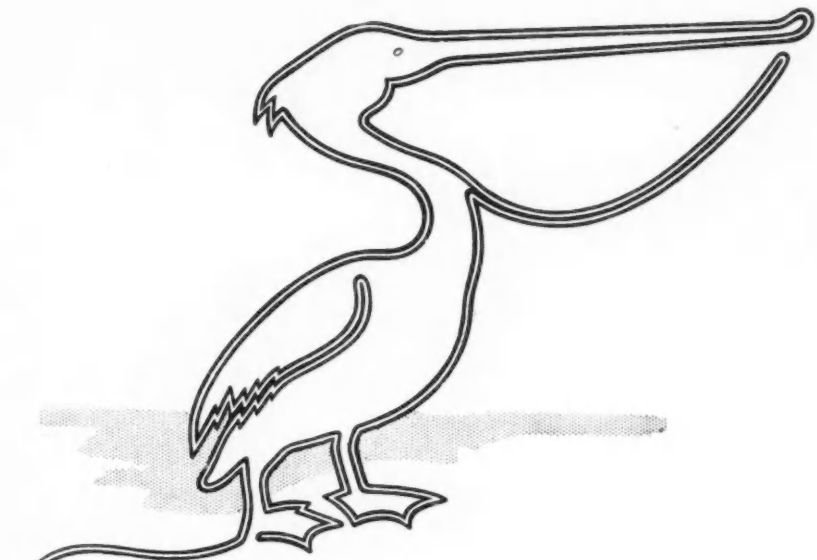

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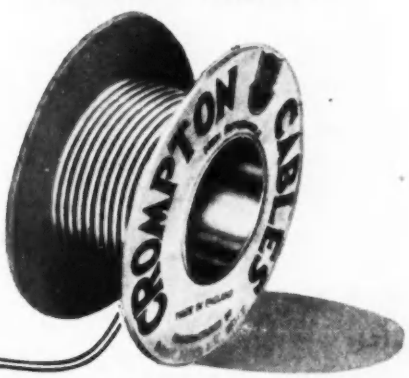

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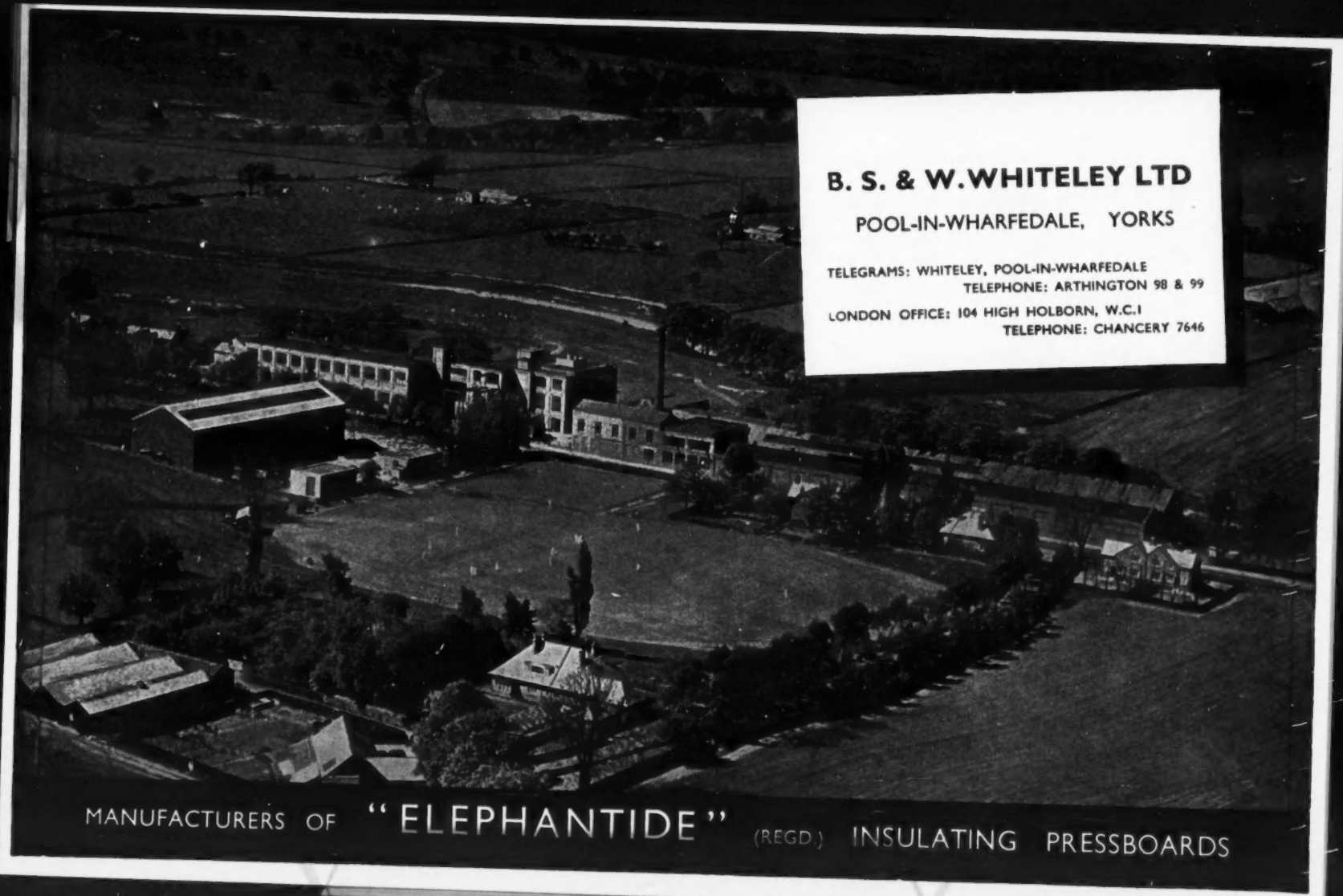
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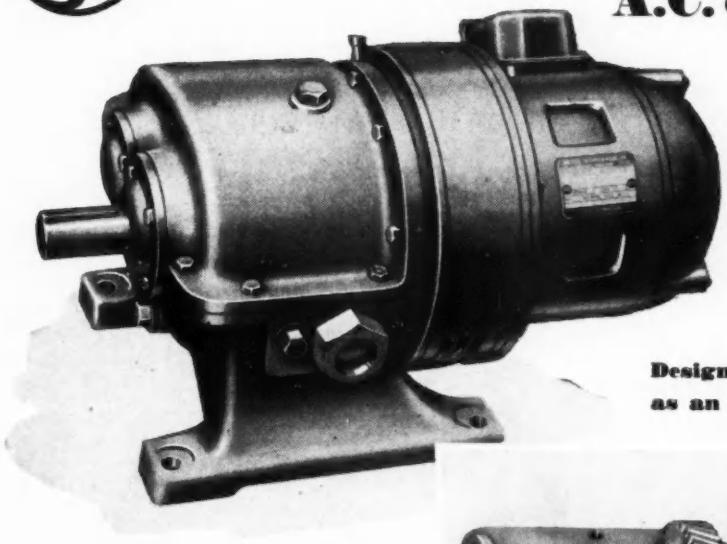

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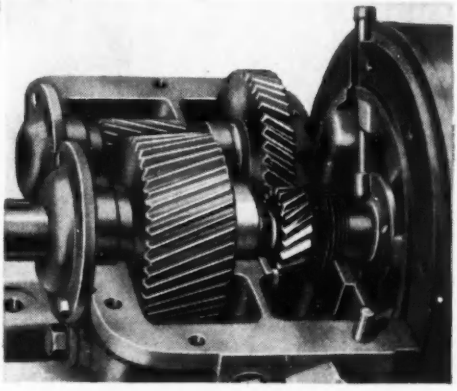

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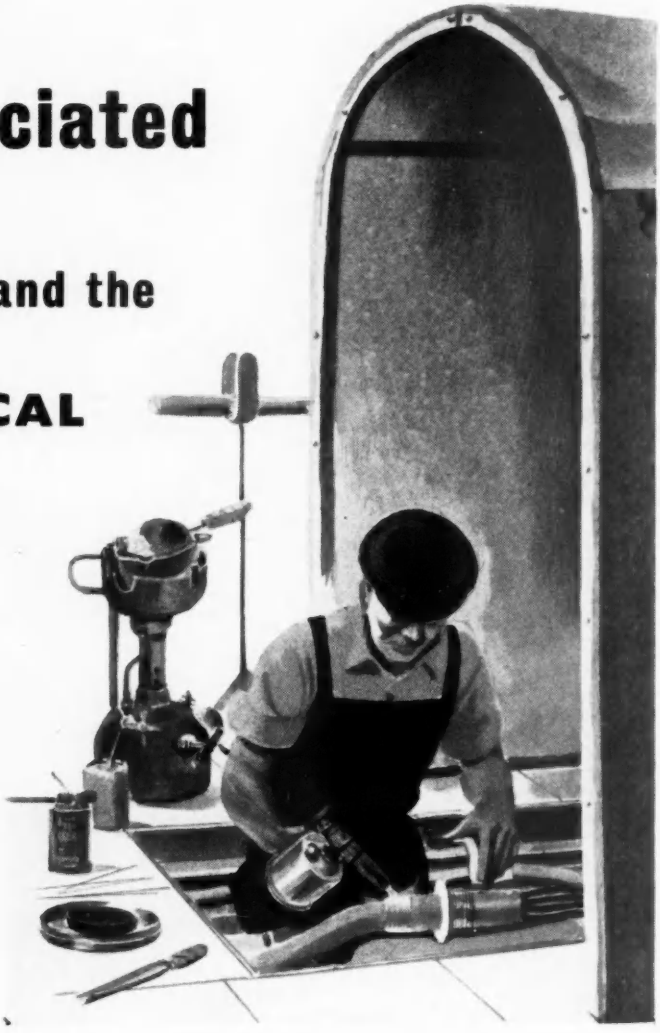

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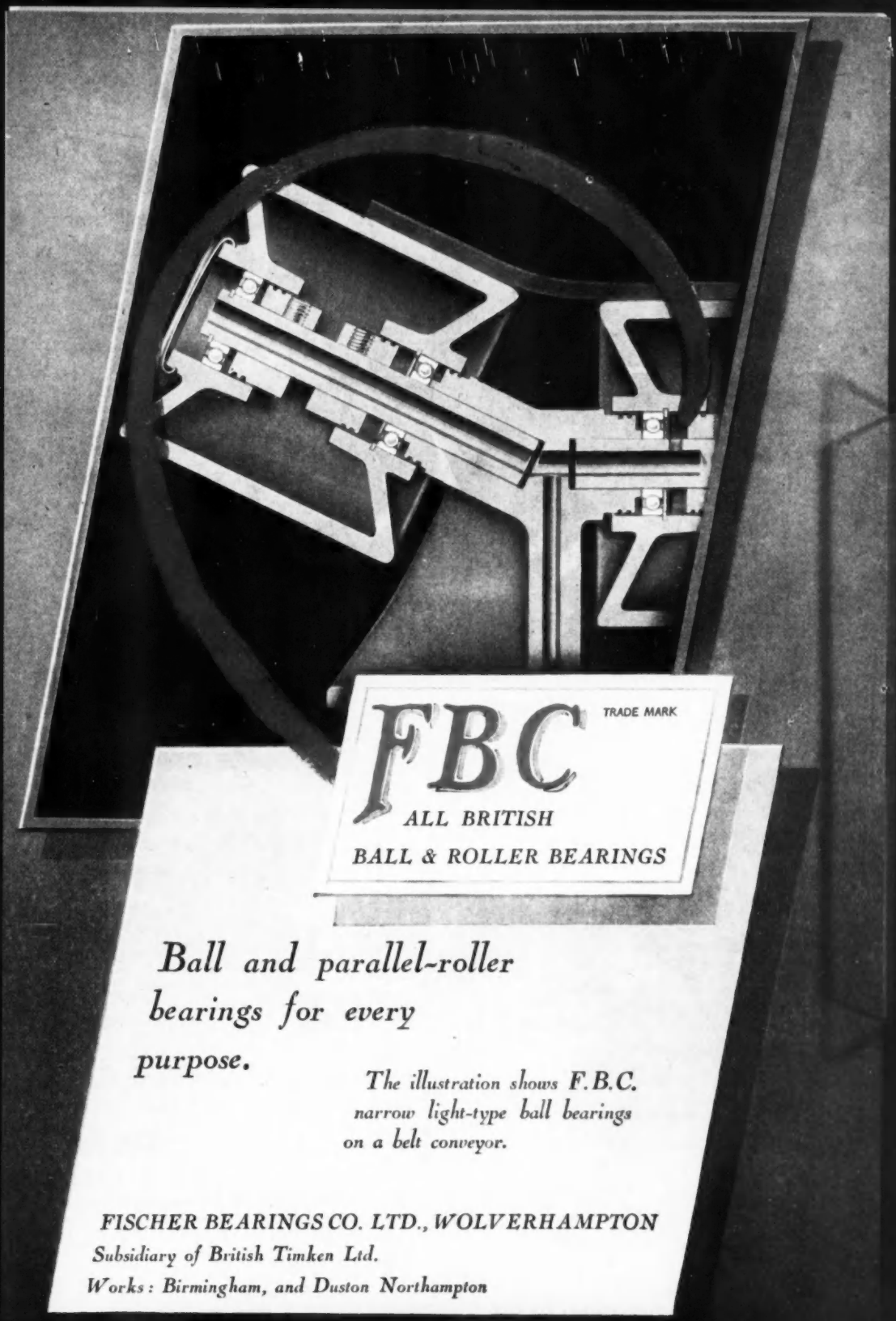

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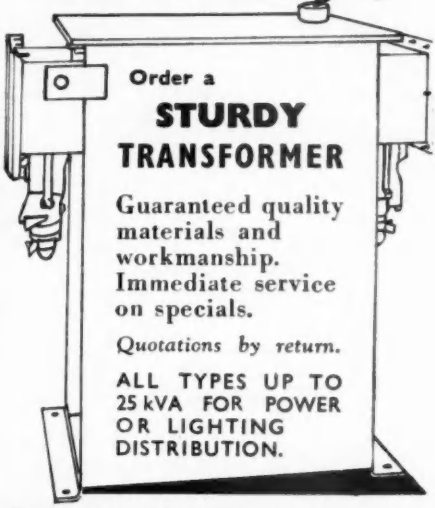

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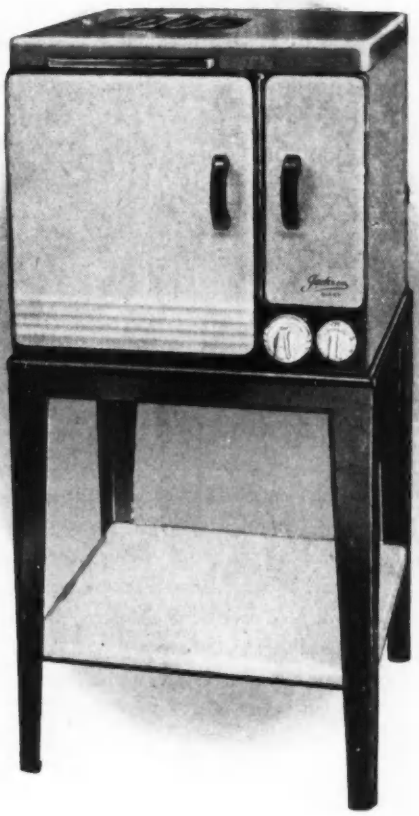

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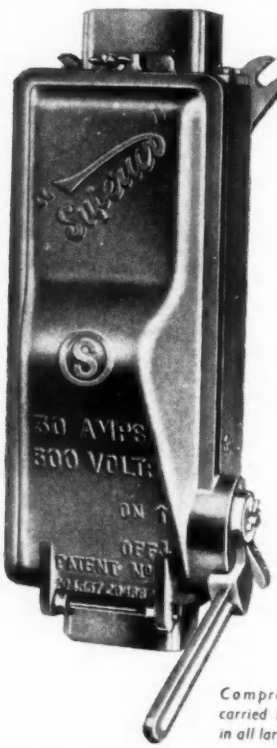

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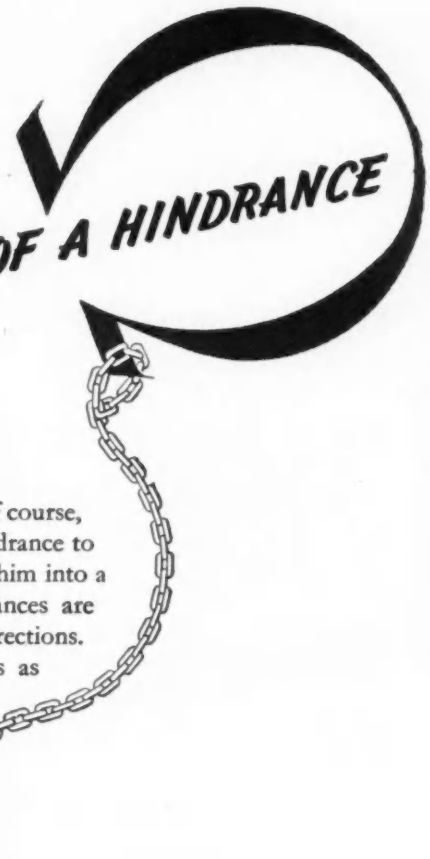

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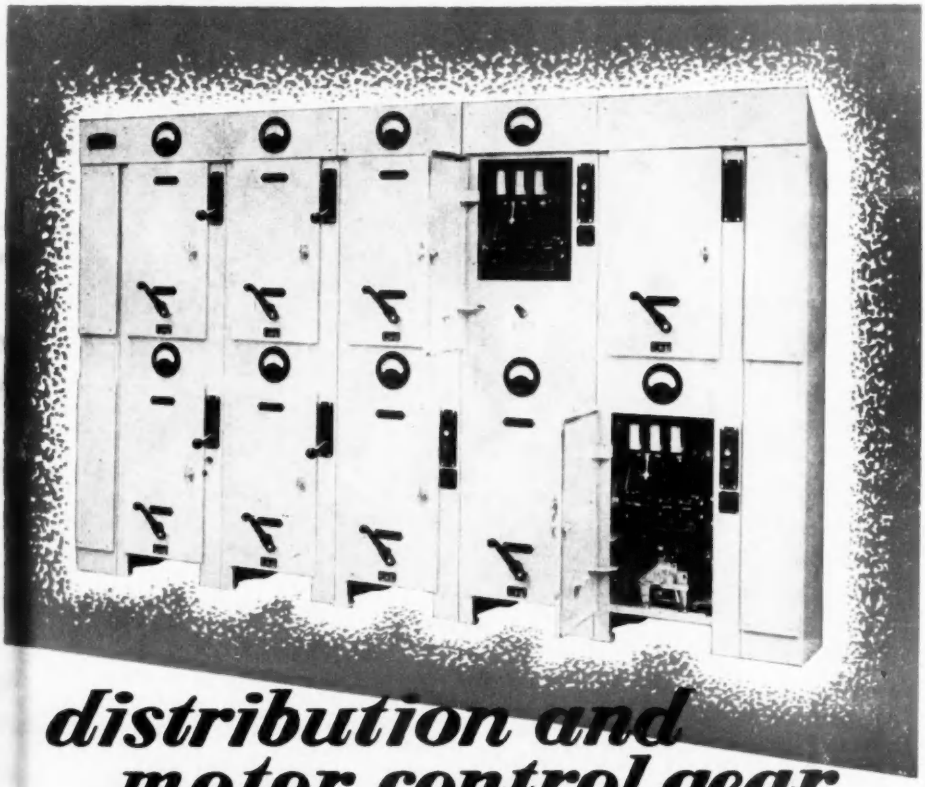

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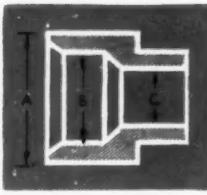
The patented key ensures that the ferrules can only be assembled with the figures in line, and CANNOT COME OUT OF ALIGNMENT AFTERWARDS.

Standard colours are black with white figures and white with black figures, but other colours can be supplied to special order at the same prices.



STANDARD SIZES			
SIZE	A	B	C
1	.275"	$\frac{3}{16}$"	$\frac{3}{32}$"
2	.354"	$\frac{1}{4}$"	$\frac{9}{64}$"
3	.406"	$\frac{5}{16}$"	$\frac{9}{64}$"

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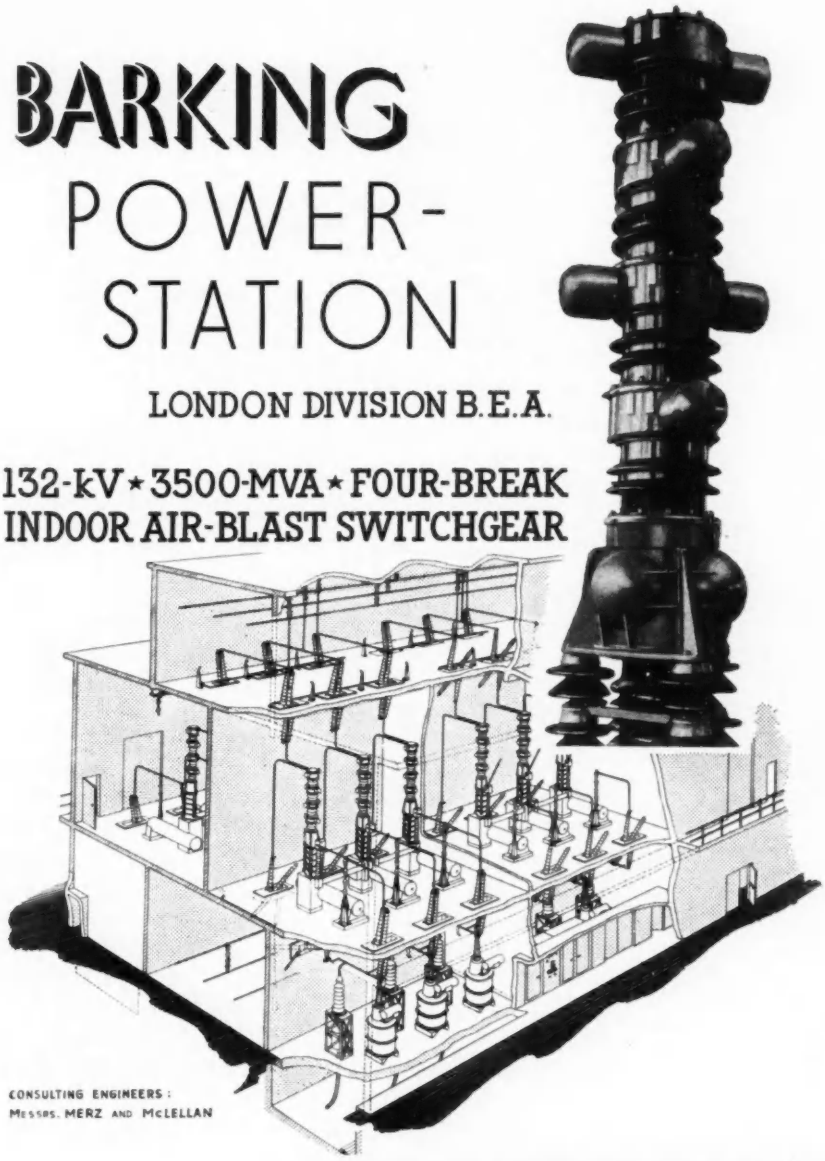
BARKING POWER-STATION

LONDON DIVISION B.E.A.

132-kV ★ 3500-MVA ★ FOUR-BREAK
INDOOR AIR-BLAST SWITCHGEAR



CONSULTING ENGINEERS:
MESSRS. MERZ AND MCLELLAN

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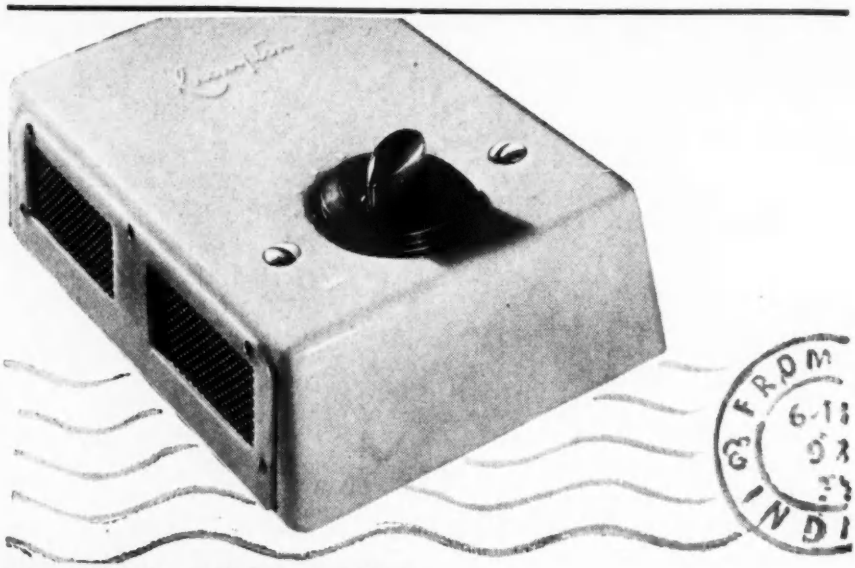

FAN-MAIL FROM INDIA

The parts of this Crompton-Parkinson fan regulator housing have to be moulded within carefully defined limits and a high finish is required of the external components.

Although it represents a straightforward compression moulding job, details such as the ingenious design of the air vent claim attention. This consists of wire gauze held between two moulded plates, the whole being assembled as a single unit. In addition to the housing and control knob, there is an internal contact plate having metal inserts.

These mouldings, simple in themselves, nevertheless underline Streetly RELIABILITY. We have been moulding them for Crompton-Parkinson Ltd. for 13 years, during which our customer has received many thousands of orders from India and the Middle East. During that long period our own high standard of moulding and finishing and meticulous system of inspection have contributed significantly to our customer's own smooth production. Even if we mould a small percentage of rejects (and who doesn't), the customer never sees them. *We* weed them out, *before* delivery.

B·I·P GROUP

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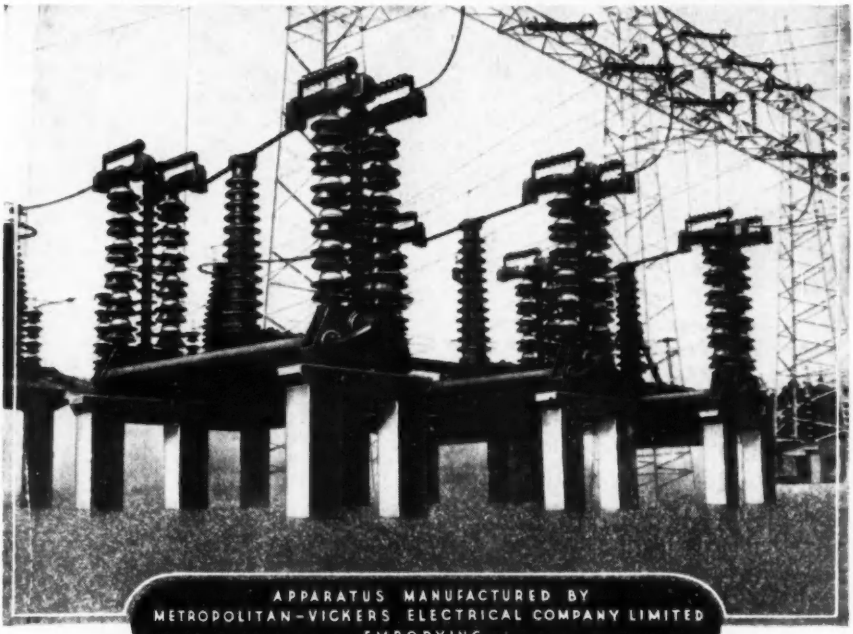
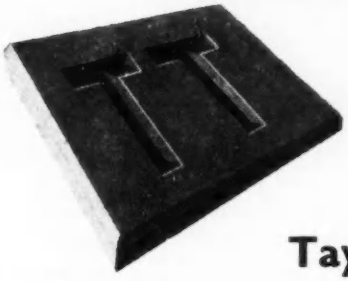
THE STREETLY MANUFACTURING CO. LTD., STREETLY, SUTTON COLDFIELD, Nr. BIRMINGHAM. *'PHONE:* STREETLY 78411 *'GRAMS:* BANG STREETLY.

PORCELAIN INSULATORS for AIR BLAST CIRCUIT BREAKERS



APPARATUS MANUFACTURED BY
METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED
EMBODYING
TAYLOR TUNNICLIFF INSULATORS



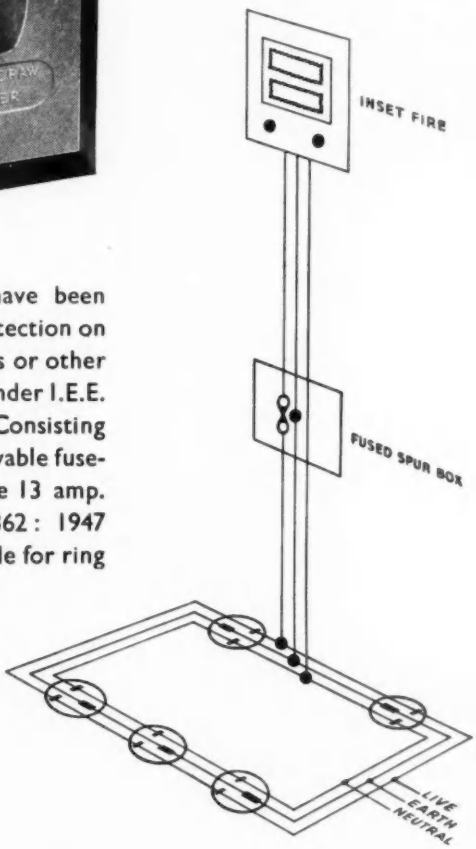
The photograph shows 220kV 3,500 MVA Metrovick air-blast circuit breakers installed in Finland — the first 220kV air-blast breakers made in Great Britain

Taylor Tunnicliff & Co Ltd.

EASTWOOD · HANLEY · STAFFS · *Telephone : Stoke-on-Trent 5272/4*

London Office : 125 High Holborn, London, W.C.1 · Telephone : Holborn 1951/2

M.K. FUSED SPUR-BOX



The M.K. fused spur-boxes have been designed to give local fuse protection on ring main circuits to inset fires or other fixed appliances, as required under I.E.E. Rule 201 (d) Twelfth Edition. Consisting of a terminal base with a removable fuse-carrier containing a single pole 13 amp. cartridge fuse-link to B.S. 1362: 1947 type C. Ample provision is made for ring main connections. Flush type as illustrated, are suitable for one gang boxes, B.S. 1299 : Part 1 : 1946 and B.S. 1363 : 1947. Also made in surface type.

M.K. ELECTRIC LIMITED
WAKEFIELD STREET, EDMONTON, LONDON, N.18
Telephone: Tottenham 5151 (6 lines) *Telegrams*: Multiconta, Southtot, London

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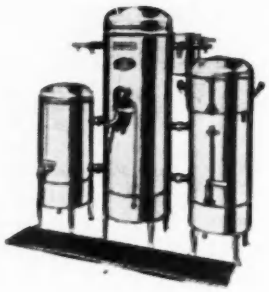

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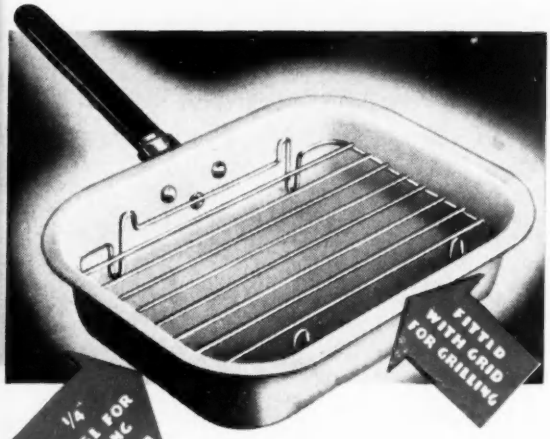

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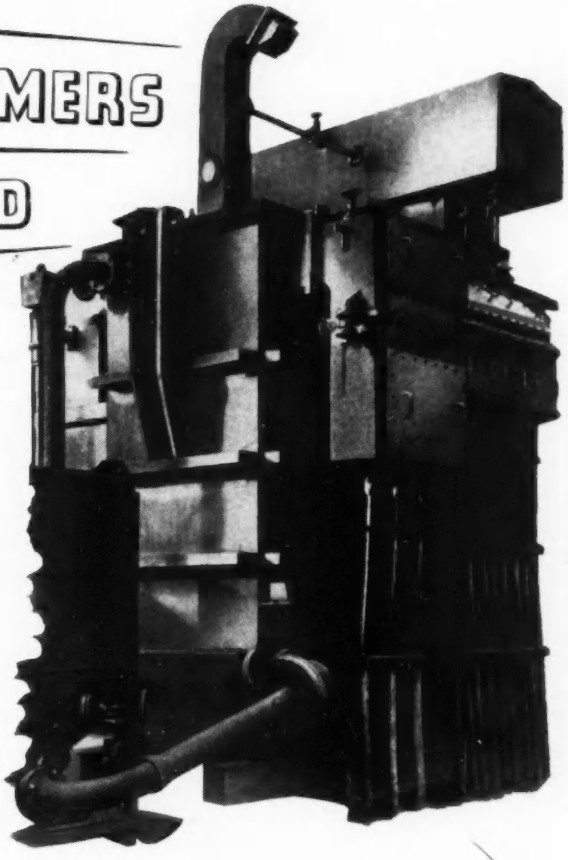

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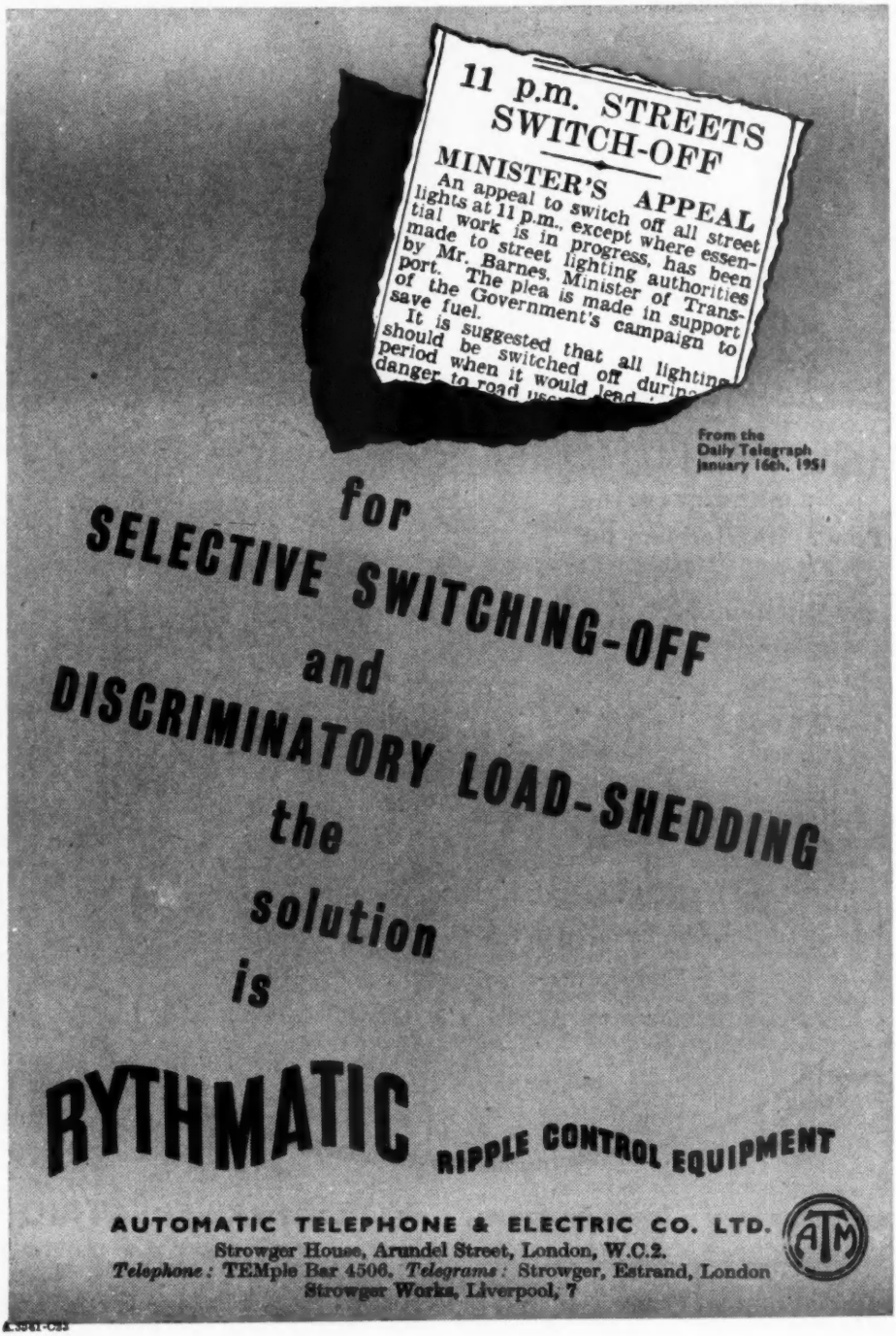
11 p.m. STREETS SWITCH-OFF
MINISTER'S APPEAL
An appeal to switch off all street lights at 11 p.m., except where essential work is in progress, has been made to street lighting authorities by Mr. Barnes, Minister of Transport. The plea is made in support of the Government's campaign to save fuel.
It is suggested that all lighting should be switched off during period when it would lead to danger to road
from the Daily Telegraph January 16th, 1951
for
SELECTIVE SWITCHING-OFF
and
DISCRIMINATORY LOAD-SHEDDING
the
solution
is
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Telephone: TEMple Bar 4506. Telegrams: Strowger, Estrand, London
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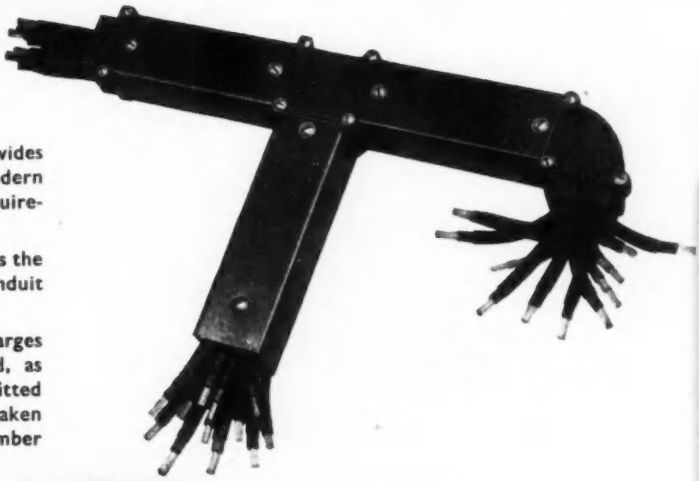

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- One Cable Trunk takes the place of multiple conduit runs.
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Cable Trunking with covers removed to show bunching of cables.

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PATENTED UNIVERSAL HOME OFFICE SHIELD

CAT. No. AL107

Fits any lamp or lampholder . . .

Due to the variations in the size and shape of lamps, the ordinary threaded shield cannot be safe under all conditions, and can of course only be used with the lampholder for which it is made.

This patented shield can be used with *any* lampholder (made to B.S.52), and *any* lamp which fits the holder. It provides perfect safety to the user during insertion or removal of the lamp and also when it is installed.

"FAIR DO'S FOR ALL"

For reasons which are only too well known, the raw materials situation is likely to become increasingly difficult in the coming months. As a result supplies of our accessories may be much less than the demand for them, which is growing every week. All our customers are nevertheless asked to accept our assurance that everything available will be shared with absolute fairness and no effort will be spared to fill all orders accepted.

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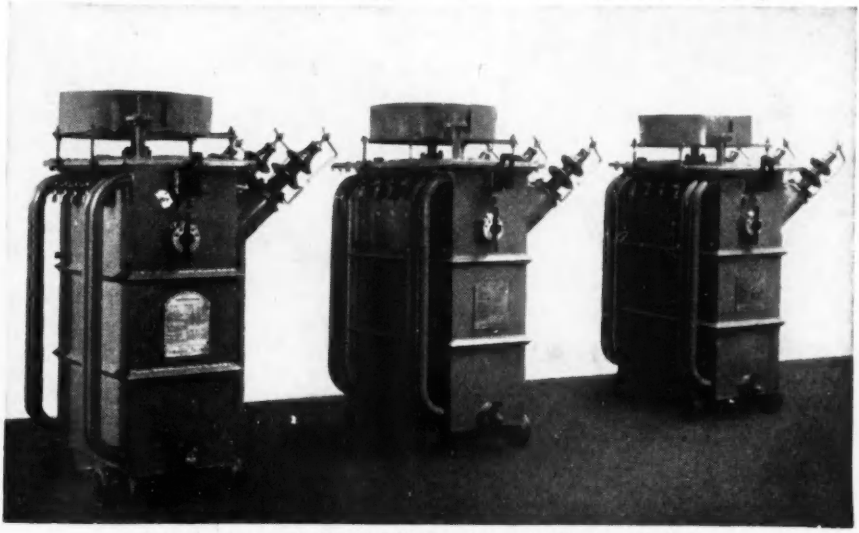

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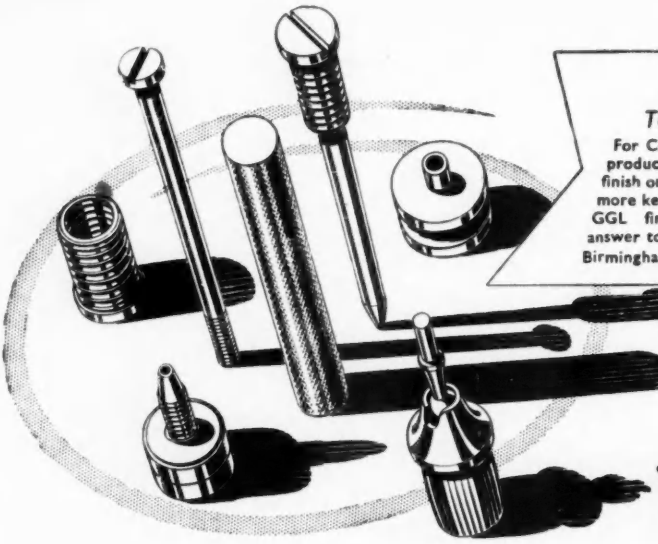

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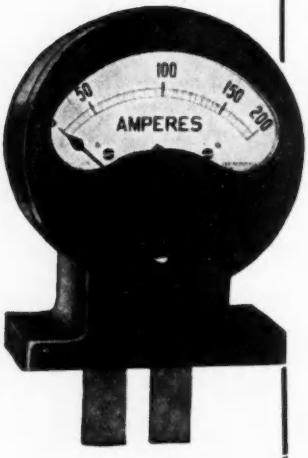

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AC/DC MOVING IRON, RANGES FROM 5 amps UP TO 300 amps. Self-contained. DC MOVING COIL, STANDARD RANGES, AMMETERS WITH EXTERNAL SHUNT.

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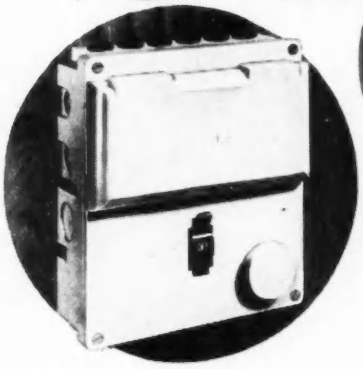
INSULATED SWITCH AND FUSE CHAMBER

(British Patent No. 577848)

for Consumer's Services HAS THESE ADVANTAGES



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SIMPLE IN USE Safe, quick and easy fuse replacement.

Available in Cream, Black or Brown.

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4 Moulded knock-outs for cable entry in four sides and back.

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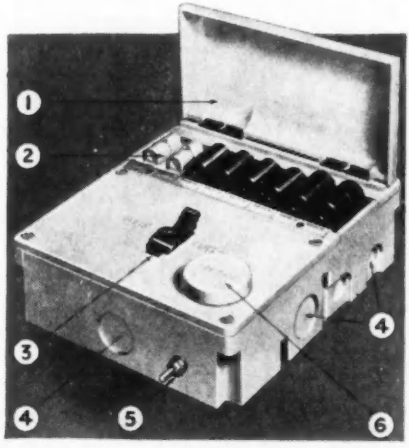
6 Spare fuse-links.



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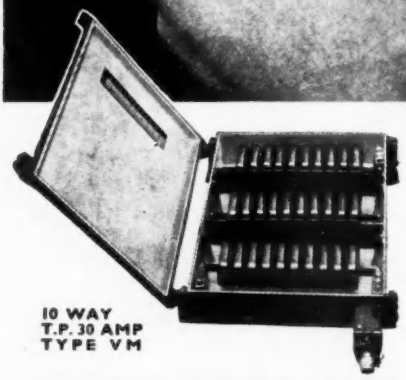

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STREET LIGHTING EQUIPMENT

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GAS CONVERSION

Brackets supplied complete with box to house control gear for Mercury or Sodium Lanterns D.C. Bias or Ripple Control Time Switch. DP Fuses, Sealing Chamber, etc.

A. C. FORD LTD.
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Whenever light is needed . . .

The ELLIOTT LIGHTING CONTROLLER *switches on automatically*

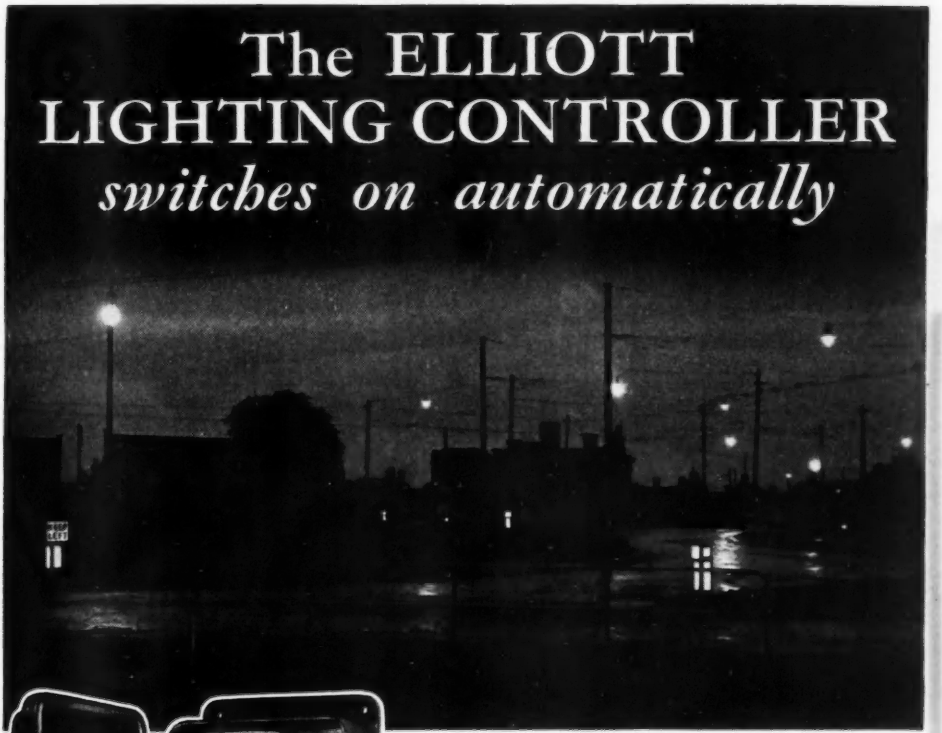

Photo by courtesy of Nottingham Corporation Lighting Committee

Reliability and simplicity are the keynotes of the Elliott Lighting Control System, which switches on whenever low light values occur, not only at night, but also during daylight storms and fog. The system is particularly suitable for remote islands, crossings, etc., as it requires no routine maintenance or resetting. Operation is by means of a barrier-layer photocell and magnetic amplifier—no valves are employed.

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for use with conduit. Maximum heat dissipation 20° light cut-off (Internal reflector) Cast aluminium body. Class B (B.S.889) cover glass. M.O.F. & P. Cert. Flp. 2272

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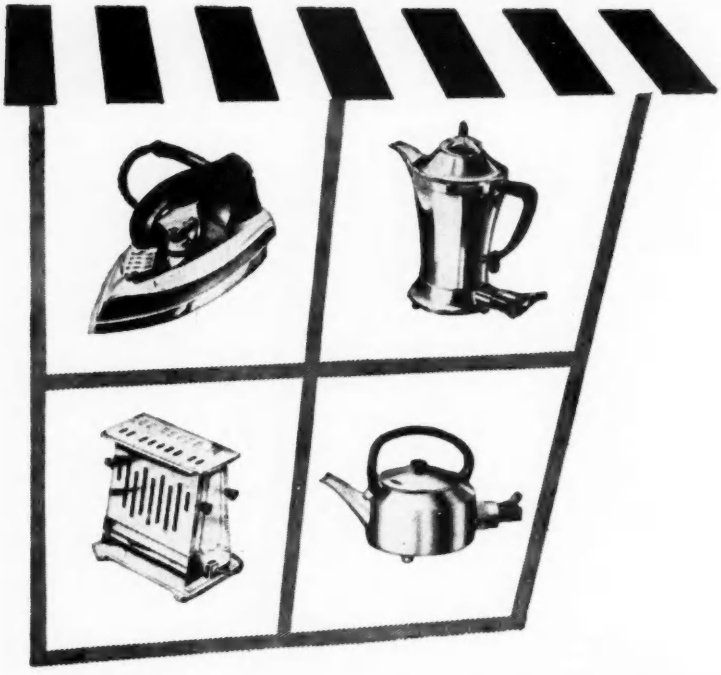

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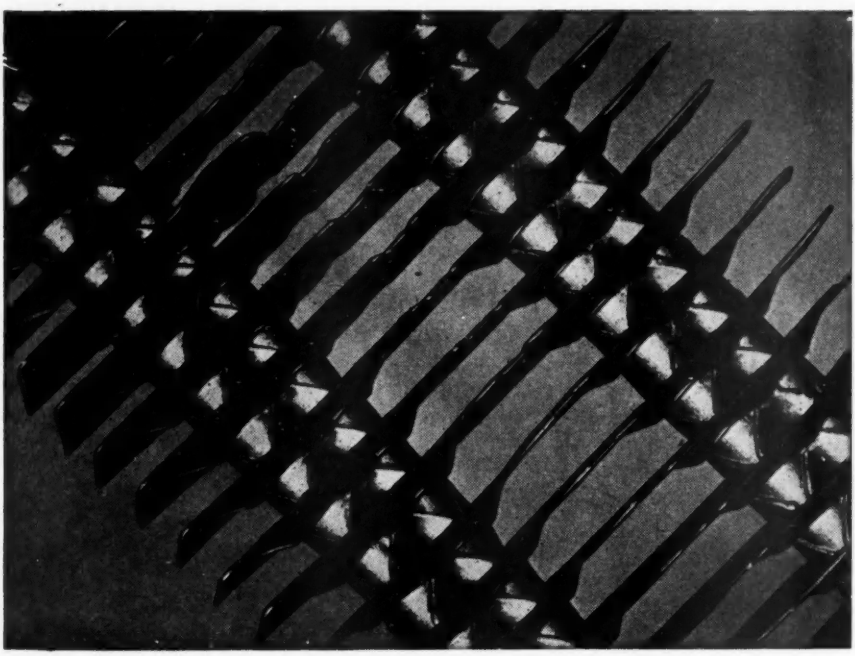

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Editorial

COAL CRISIS II

FOUR years after the greatest crisis the supply industry has ever known, it is once more faced with a shortage of coal. The first question on everyone's lips is why this deterioration in stocks should have been allowed to take place. Unfortunately, amid the morass of explanations and excuses that have been doled out to the public, the simple basic cause has been overlooked: electricity consumption has been increasing at 7½ to 9% per annum; coal deliveries have been increasing by only 5½% per annum. It is the accumulation of this 2-3½% deficit over four years that is the direct cause of our present plight. This fact must have been known to the authorities; indeed, six months ago on this page attention was drawn to the position, yet nothing was done until the cold spell in December sent electricity consumption well above the previous year's figures. Although this increase is spoken of as abnormal, it is in part due to the mild weather of last winter having masked the growth in potential demand, and taking the two years 1949 and 1950 together, the increased consumption amounts to no more than 9% per annum. Pre-war experience showed that it is the long-term trend which is the basic factor in forecasting, not the vagaries of the British climate, and had this trend been balanced by deliveries to power stations there would be no crisis today.

PANIC MEASURES

BUT is there a crisis? Is the shortage of such a magnitude as to justify the radical steps taken by the Ministry? At the end of December, power station coal stocks were still standing at 3 million tons. Bearing in mind the higher electricity consumption, the situation was serious, but had hardly reached danger point. The lowest ebb in the 1947 crisis was 900,000 tons, and although a goodly margin must be added to this figure for safety and for four years' increase in energy demand, it remains a long way from the current stock figure. It is presumed, also, that stocks are better placed strategically than in 1947. All these considerations, however, presuppose maintenance of normal coal deliveries. Unfortunately, there has been a shortfall in opencast production which has necessitated diversion of deep-mined coal to power stations, but it is hardly needed in such quantities as to justify the 1½ million tons to be taken from industry. No simpler evidence of this is required than that in the middle of January power station stocks remained stationary when normally they would be expected to fall. No! the real danger of coal shortage is not this winter, but next, and just as the panic measures in 1947 enabled stocks to be built up at a time when they would normally be falling, so we feel the present restrictions have been made, not so much to safeguard the immediate position, but to prevent stocks falling to a value from which they could not adequately recover by normal summer deliveries in the present deplorable state of the coal market.

COMPOUNDING AN ERROR

THE shadow of the coal crisis has provided a convenient psychological opportunity to raise coal prices, and, while users are preoccupied with finding sufficient coal, the increase of 4s. 2d. a ton in pithead price is likely to pass with a minimum of protest. During the war there were several flat increases of this type, which took no account of calorific value. In consequence the prices of low-grade coals became

absurdly out of proportion to those of the better qualities. When stocks of low-grade fuel commenced to pile up, however, attempts were made partially to restore the balance, by adjustments which were announced as interim, depending on the final working out of a satisfactory price formula. Now, after four and a half years of control, the National Coal Board falls back on the inept policy of flat increases. Are we to believe that they are incapable of working out a satisfactory price formula, or are they deliberately exploiting the present coal shortage to demand a black-market price for low-grade coal?

CHOICE OF TEXTBOOKS

MOST of us have been asked at some time or the other to recommend textbooks for engineering examinations—and have found the memory of the books that we ourselves used of little value. Too often they are out of date and out of print. "Meteor," looking around for further help in this matter, found that quite a few of the examining authorities issue carefully prepared lists of books suitable for students. It is unfortunate that these documents do not seem to be widely publicised as they can be useful both to those preparing for the larger examinations, for which are available a baffling collection of specially written books, and to those who have the opposite difficulty. Those examiners who do not issue such lists are probably deterred more by the dislike of seeming to examine on particular textbooks than by the work involved in compiling a suitable bibliography. On balance, the lists are worth while. In their absence, "Meteor" and his fellow engineers will continue to offer to inquirers well-meaning, but possibly less helpful information.

UNWANTED COLLEGE

SPEAKERS in last week's House of Lords debate on higher education seemed to share our views on the Royal College of Technologists which was proposed by the National Advisory Council on Education for Industry and Commerce. Overwhelmingly, they condemned the suggested foundation and its various awards. Unanimity was lacking as to the best alternative, but there was general agreement that the university was the place for the education of the technologist, as distinct from the technician. Both the expansion of existing departments and the establishment of new "technological institutions" found supporters; it was considerations of economy in staff and of finance that led to the principal disagreement. The Government spokesman, in answering the debate, largely contented himself with reviewing the advantages of the technical college as a second pathway to qualification as a technologist. The arguments against the Royal College were largely unanswered, and with them, the questions inquiring whence had come "the strong measure of support" which had encouraged the Council to suggest its foundation. With this debate added to the many other attacks on the Week's Report, it is to be hoped that the Minister of Education, in furtherance of his undertaking to consider any comments on the subject that may be made to him, will give an early quietus to this unfortunate idea.

GOODS BY RADIO

MECHANICAL handling has been much in the news recently, but the latest advance in technique reported in the American press beats most ideas that have reached this country. Fork lift trucks operating in the warehouse of a large New Jersey company have been equipped with two-way radio to keep them in constant communication with a central despatching point. There, a controller provided with a space lay-out chart and stock location cards which tells him where all the goods and materials to be moved are situated, can order the trucks from job to job economically without involving them in unprofitable journeys back to some control office for instructions. Whatever may be thought of the economics of such a scheme—and the overall cost of operating the radio system must be considerable—it has to be admitted that it is a logical extension of the materials handling principle that all unnecessary movement must be avoided.

Meteor

Sagging Overhead Lines

The Equivalent Span—Its Derivation, Meaning and Use

By L. J. ARCHER, A.R.C.Sc.I., B.Sc., A.M.I.E.E.

IN B.S.S. 1320 the Equivalent Span of a section of overhead line between rigid supports, the conductors being free to move longitudinally at intermediate supports, is defined as "The span in which tension variations are identical with those in the line or section of line," and its value is given as

$$\sqrt{\frac{L_1^3 + L_2^3 + L_3^3 + \ldots}{L_1 + L_2 + L_3 + \ldots}}$$

This hypothetical span is sometimes referred to as the characteristic span. Its value may be written more briefly $\sqrt{\frac{\Sigma L^3}{\Sigma L}}$, Σ being the summation symbol.

The value of the Equivalent Span is reached as follows:—

When a conductor is suspended between two supports the tension and the sag in the conductor are related by the hyperbolic equation

$$S = c\left(\cosh \frac{L}{2c} - 1\right) \ldots\ldots\ldots\ldots (1)$$

where S is the sag, L the span length, and c is equal to T/w, w being the weight per unit length of conductor and T being the tension in it. The length of conductor in the span is given by

$$L_c = c \sinh \frac{L}{2c} \ldots\ldots (2)$$

If cosh L/2c is expanded as

$$1 + \frac{L^2}{2(4c^2)} + \frac{L^4}{24(16c^4)} + \frac{L^6}{720(64c^6)} + \ldots\ldots$$

since L/c is normally small the fourth term in the expansion is negligible and in most cases the third term also may be neglected.

For the present, retaining the third term, equation (1) may be rewritten

$$S = c\left(1 + \frac{L^2}{8c^2} + \frac{L^4}{24(16c^4)} - 1\right) = \frac{L^2}{8c} + \frac{L^4}{384c^3}$$

$$= \frac{L}{c} \cdot \frac{L}{8} + \left(\frac{L}{c}\right)^3 \frac{L}{384} \ldots\ldots\ldots\ldots (3)$$

and L/c = wL/T i.e. the ratio of the weight of conductor in the span to the horizontal tension (neglecting the difference between span length and conductor length). For spans normally employed in this country the value of L/c is unlikely to exceed 0·3 in which case the second term in the above expression for S represents less than 0·2% of the whole and may obviously be neglected. In the case of abnormally long spans or abnormally low tensions, however, this term may be significant.

Neglecting the second term in (3) we have

$$S = L^2/8c \text{ or } S = wL^2/8T \ldots\ldots\ldots\ldots (4)$$

which is the familiar parabolic equation connecting sag, conductor weight and tension in an overhead line span.

Similarly, if in equation (2) for the conductor length sinh L/2c is expanded to

$$\frac{L}{2c} + \frac{L^3}{6(8c^3)} + \frac{L^5}{120(320c^5)} + \ldots\ldots\ldots\ldots$$

we have $L_c = L + \frac{L^3}{24c^2} + \frac{L^5}{1920c^4}$

very nearly,

$$= L + \left(\frac{wL}{T}\right)^2 \frac{L}{24} + \left(\frac{wL}{T}\right)^4 \frac{L}{1920}$$

and again the fourth power term is negligible and the equation becomes

$$L_c = L + \frac{w^2L^3}{24T^2} \ldots\ldots\ldots\ldots (5)$$

$$= L + \frac{8S^2}{3L}$$

Temperature Effects

When the conductor undergoes changes of temperature and loading, the tension in it is altered. The equation which relates the tension under the changed conditions to that which existed previously may take many forms, that which the present writer finds most convenient being

$$T_2^3 + T_2^2\left[\left(\frac{k_1 w_1}{T_1}\right)^2 L^2 - T_1 + k_2 t\right] - (k_1 w_2)^2 L^2 = 0$$

in which $k_1 = \sqrt{EA/24}$, where E is the modulus of elasticity and A the area of the conductor, and $k_2 = \propto EA$, $\propto$ being the coefficient of linear expansion. "t" is the value of temperature change, to the same temperature scale as that to which $\propto$ is referred. L, T, and w have the meanings already assigned to them and the suffixes relate to the initial and final conditions.

For solution on the slide rule the equation may be written

$$T_2^2\left[T_2 + \left\{\left(\frac{k_1 w_1}{T_1}\right)^2 L^2 - T_1 + k_2 t\right\}\right] = (k_1 w_2)^2 L^2 \ldots\ldots\ldots\ldots (7)$$

It is thus apparent that T depends not only on the initial and final states but also on the span length, and that if two spans of unvarying but different lengths are strung at the same tension they will not have the same tension after a change of condition, i.e. at a different temperature or under different loading conditions.

Effect of Supports

In the case of spans carried on perfectly rigid supports, the difference of tension will exist unrelieved. Where, however, supports have flexibility, this tends to even out the horizontal tensions existing in adjacent spans. In the case of lines carried on long strings of suspension insulators, a small inclination in the insulator string cannot produce any significant horizontal component and the change of state is accompanied by a change in span lengths such that the horizontal tension throughout the section is approximately the same in all spans whatever the conditions of temperature and loading.

With lines on one or two suspension insulators, a displacement from the vertical can result in an appreciable horizontal component, and with lines on pin insulators, bending of the supports or slipping of the binders must take place if the horizontal tension is to even itself out over the section. In spite of this it is now the usual practice to assume for lines on light supports (such as single wood poles) such flexibility in the supports as will prevent the existence of any appreciable tension difference throughout the section. While this assumption cannot readily be justified, it at least results in a basis for sagging the section which is an improvement on the old method of choosing one arbitrary "basic" span on which tensions were calculated for all conditions, and sagging all sections so that the tension at the time of erection corresponded to the tension calculated for that particular temperature in the "basic" span.

From equation (6) it may be seen that if all spans have the same length, the tension following any change of state will be the same for them all if they have been erected under the same conditions.

Derivation of Equivalent Span

Assuming that the supports at each end of the section are rigid, the length of the section remains constant. Suppose that at any given condition of temperature and loading the existing system of spans is replaced by a system of equal spans such that the total length of con-

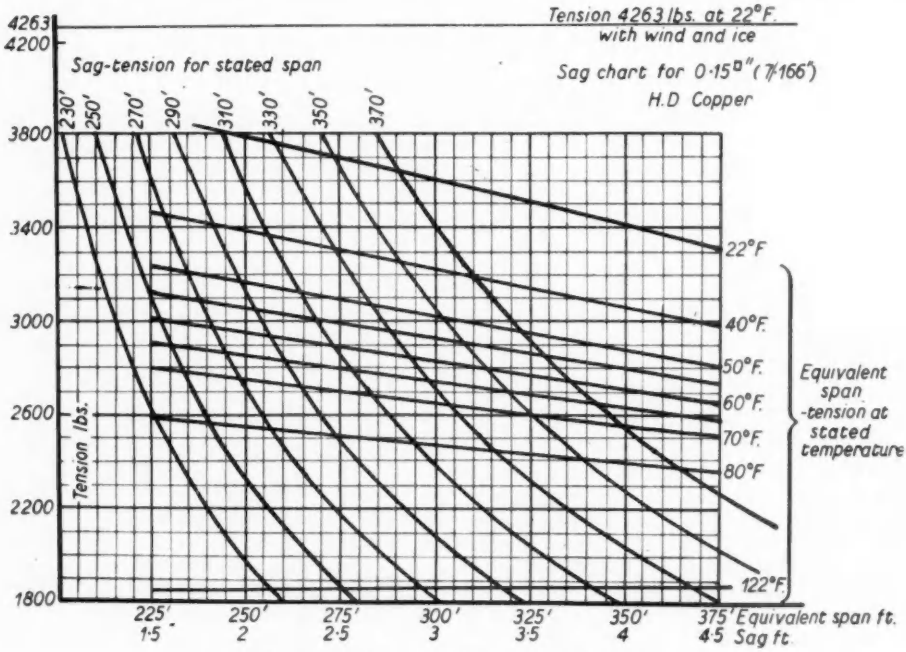


Chart showing curves of "L" for various temperatures

ductor and the horizontal tension remain unchanged. Since all spans are now of equal length, the tension in each will be similarly affected by any change of state.

The relation between the original system and the new one of equal spans is given by the equation $\Sigma L_c = nL_{CE}$ ..... (8)
where ΣL_c is the sum of the lengths of conductor in the original spans, L_{CE} is the length of conductor in each of the equal spans, and n the number of such spans into which the section may be divided. This follows from the fact that each side of the equation is the total length of conductor in the section. (Note that n is probably not a whole number).

From equation (5) $L_C = L + \frac{w^2L^3}{24T^2}$

and $L_{CE} = L_E + \frac{w^2L_E^3}{24T^2}$

substituting in (8)

$$\Sigma L + \frac{w^2}{24T^2}\Sigma L^3 = n\left(L_E + \frac{w^2L_E^3}{24T^2}\right)$$

But both ΣL and nL_E are the total length of the section, which, since the end supports have been assumed rigid, does not alter; therefore $n\frac{w^2L_E^3}{24T^2} = \frac{w^2}{24T^2}\Sigma L^3$

or $nL_E^3 = \Sigma L^3$

As stated above $\Sigma L = nL_E$

$$\therefore \quad L_E^2\Sigma L = \Sigma L^3$$

or $L_E = \sqrt{\frac{\Sigma L^3}{\Sigma L}}$ ..... (9)

Equation (9) is independent of T or w, thus L_E is the same no matter under what condition of temperature and loading the supposed replacement has been carried out. L_E then is the span which behaves in the same way as the section as a whole, or, in the words of B.S.S. 1320, "The span in which tension variations are identical with those in the line or section of line."

It should be stated here that this proof ignores the fact that though ΣL is constant for all conditions ΣL^3 is not strictly so. In fact the assumption is that small changes of individual span lengths take place. In practice however only very small changes of span length are needed to effect the desired evening out of tension, since the effect is to tighten up one span while easing the next. These changes of length therefore being very small compared to the spans (a matter of inches in hundreds of feet) their effect on the value of ΣL^3 may be ignored and it may be regarded as constant under all conditions.

Field Application

In order to sag a section on the above basis the erection tension should be found from equation (6), or equation (7), using L_E for L. T_1 will be the permissible tension, and w_1 the effective weight (including any wind/ice load) of the conductor for the design conditions.

In B.S.S.1320 tables for each size of conductor considered are given. These tables have been prepared for a range of equivalent spans, and one (Table C) shows Erection Sags for a definite span length at various temperatures and tensions. The other (Table D) shows Erection Tensions in various equivalent spans at different temperatures. In order to apply Table C to sections having an equivalent span other than that for which the table has been prepared one is instructed to adjust the sag in inverse proportion to the appropriate tension given in Table D.

It is difficult to see why the compilers of the specification decided to include temperatures in Table C and to relate it to any particular span length. This seems unnecessary if not actually confusing, as, since $S=wL^2/8T$, the sag for any span is inversely proportional to the tension and once the appropriate tension has been found for the section in question from Table D the sag for that tension in any span can be read from Table C, interpolating as necessary, without the need for making any inversely proportional adjustment. Using the table thus, the temperature column is ignored.

Use of Chart

As an alternative to tables, a chart* may be plotted showing curves of L against tension for various temperatures. These curves are calculated from equation (6), or (7), using a series of values of L for each value of t. (t is positive for an increase of temperature). On the same chart a second set of curves may be plotted showing tension against sag for various span lengths, the latter set of curves being calculated from equation (4).

For general office use such a chart might be plotted for a wide range of spans, but for field use one would normally be prepared to cover the range of spans and equivalent spans which one expected to encounter on the type of line under construction.

The equivalent span for a section having been calculated, the temperature at the time of sagging is taken and for the appropriate curve (interpolating as necessary) the corresponding tension is read on the Y axis. If it is intended to sag by dynamometer this is the tension to use. It is however more usual to sag by "sighting in" the conductor in some con-

venient span. Having therefore selected a suitable span the sag corresponding to the tension already determined is read from the second set of curves using the curve appropriate to the span selected, or interpolating between two curves if necessary.

TABLE 1.—TENSION IN POUNDS

TEMP. °F.	SPAN LENGTH							
	24.9t	225	250	275	300	325	350	375
22 (w & I)		4,263	4,263	4,263	4,263	4,263	4,263	4,263
22	0	3,870	3,785	3,696	3,601	3,504	3,406	3,310
40	448	3,456	3,381	3,303	3,221	3,140	3,059	2,980
50	698	3,230	3,162	3,092	3,019	2,947	2,876	2,807
55	822	3,120	3,056	2,989	2,921	2,856	2,789	2,726
60	946	3,011	2,950	2,889	2,826	2,766	2,704	2,648
65	1,070	2,903	2,847	2,791	2,732	2,675	2,622	2,572
70	1,195	2,797	2,746	2,694	2,642	2,590	2,542	2,497
80	1,444	2,590	2,549	2,508	2,459	2,428	2,392	2,350
122	2,490	1,838	1,847	1,855	1,862	1,869	1,875	1,880

From the above it will be seen that if the design conditions are constant maximum tension under heavy loading at low temperature, the minimum tension (and maximum sag) in each section will vary according to the equivalent span. In theory therefore a different maximum sag curve should be used in plotting the profile of each section, according to its equivalent span. In practice, however, it is usual for lines having long spans to have two or three sag curves each covering a range of equivalent spans. For lines having short spans and small sags it should be sufficiently accurate to use one maximum sag curve for all sections. This curve should be selected so as to give the maximum sag corresponding to the equivalent span for which it is greatest. This equivalent span may be the greatest or the least which it is expected to encounter, depending on the size of conductor and the design conditions. For the example chosen it will be seen from the chart that the variation of Tension at 122° F with equivalent span is slight. For other conductors or different loading conditions however this may not be the case.

Typical Calculations

For the purpose of illustration a set of calculations is given and the resulting chart is shown. The example is a 0·15 sq in. h.d. copper conductor (7/0·166 in. strand) to be erected on a line having spans between 230 ft and 370 ft. The maximum tension in the conductor at 22° F with three-eighths of an inch radial thickness of ice and a wind pressure corresponding to 8lb per sq in. on the ice covered conductor is 4,263 lb.

$T_1 = 4{,}263$ lb.
$d = 0{\cdot}498$ in. (diameter of conductor).
$w = 0{\cdot}594$ lb/ft (weight of conductor).
$w_i = 0{\cdot}406$ lb/ft (weight of ice).
$w_L = 0{\cdot}832$ lb/ft (wind load).
$w_1 = 1{\cdot}3$ lb/ft (resultant initial load).

$$k_1 = \sqrt{\frac{EA}{24}} = 335{\cdot}5$$ (where E is Young's Modulus and A the cross section area of the conductor).

$\alpha = 9{\cdot}222 \times 10^{-6}$
$k_2 = 24{\cdot}9$

$$\left(\frac{k_1 w_1}{T_1}\right)^2 = \left(\frac{335{\cdot}5 \times 1{\cdot}3}{4{,}263}\right)^2 = 0{\cdot}0104$$

$(k_1 \quad w_2)^2 = (335{\cdot}5 \times 0{\cdot}594)^2 = 3{\cdot}95 \times 10^4$
(for unloaded conductor in still air).

$$T_2^2 [T_2 + (0{\cdot}0104L^2 - 4{,}263 + 24{\cdot}9t)] = 3{\cdot}95 \times 10^4 L^2$$

For an equivalent span of 225 ft at a temperature of 22° F the conductor being unloaded in still air L=225 and t=0.

The equation becomes

$$T_2^2 [T_2 + (527 - 4{,}263 + 0)] = 2 \times 10^9$$
or $T_2^2 (T_2 - 3{,}736) = 2 + 10^9$

Slide Rule Solution

To solve this on the slide rule set the cursor at 2×10^9 on the A scale and set 1 on the C scale opposite a guessed value for T_2 on the D scale. If the guess is correct the guessed value of T_2 minus 3,736 will lie under the cursor on the B scale.

TABLE 2.—SAG IN FEET

TENSION	SPAN LENGTH							
	230	250	270	290	310	330	350	370
3,800	1.03	1.22	1.43	1.64	1.88	2.13	2.39	2.68
3,400	1.15	1.36	1.59	1.83	2.10	2.38	2.67	2.99
3,200	1.23	1.45	1.69	1.95	2.23	2.53	2.84	3.18
3,000	1.31	1.55	1.80	2.08	2.38	2.70	3.03	3.39
2,800	1.40	1.65	1.93	2.22	2.54	2.89	3.24	3.63
2,600	1.50	1.79	2.08	2.39	2.74	3.11	3.49	3.91
2,400	1.64	1.93	2.26	2.59	2.97	3.37	3.78	4.24
2,200	1.78	2.11	2.46	2.83	3.24	3.68	4.12	4.62
2,000	1.96	2.32	2.71	3.11	3.56	4.05	4.54	5.09
1,800	2.18	2.57	3.01	3.46	3.96	4.50	5.05	5.65

In this instance T_2 is 3,870 and T_2 —3,736 is 134 which lies under the cursor on the B scale.

In a similar manner values of T_2 are calculated for various values of t and L. These are tabulated in Table 1 and the curves of Equivalent Span/Tension are plotted from them.

Table 2 is prepared from the equation (4) which yields $S = 0{\cdot}0742\ L^2/T$.

The curves of Sag/Tension are prepared from this table.

* C. O. Boyse and N. G. Simpson *The Problem of Conductor Sagging on Overhead Transmission Lines.* Journal I.E.E., Part 2, June, 1944.

A Fuel Crisis Analysed

Statistics tell the past and present story of the shortage

FIGURES cannot lie but liars can figure. So quoted one Government speaker during last week's House of Commons debate on the coal situation. Possibly this saying represents a general feeling of politicians, because there was comparatively little attempt at analysing the statistics that are available to tell the story of coal and electricity over the past year.

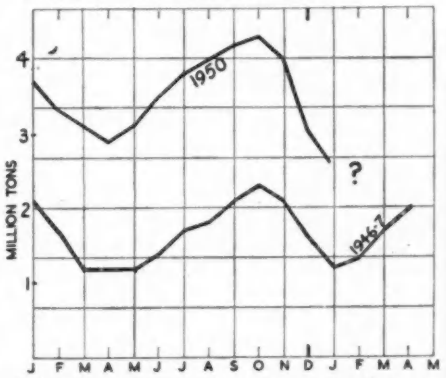
As might have been expected, most of the relevant figures that were quoted came from Mr. Philip Noel-Baker, the Minister of Fuel and Power. In a self-styled "brief but candid recapitulation of the facts" he gave the estimated inland consumption of coal during 1950 as 199 to 201 million tons, an increase of from 4 to 6 million tons on the previous year's total. Production of coal, which would meet this demand and allow for exports and for bunkers, was put at 205 to 210 million tons deep mined, and 13 million tons, minimum, opencast.

In the event, the production of deep-mined coal was 204·1 million tons, and of opencast coal, 12·2 million tons, giving a short fall on estimates of 1·7 million tons. Inland consumption, on the other hand, totalled 202·5 million tons, 1·5 million tons above the maximum allowed for, and 7·3 million tons above last year's total. The total planning error for the year was thus 3·2 million tons.

So much for current production. Stocks are —again to quote from the debate—"built up to meet emergencies." The planned target for overall stocks at the end of October was 16·5 million tons. The level actually achieved, according to the Minister, was 15·8 million tons. (In the official "Digest of Statistics" we find for end-October, 15·5 million tons distributed, 0·1 million tons opencast at sites or central stocking grounds, and 1·3 million tons colliery stocks.) Power station stocks were noted by Mr. Noel-Baker as being "about a million tons short of what we wanted," presumably at the time of the debate.

1947?

Several questions which remain unanswered by the somewhat vague statements made in the House, are clarified by an examination of available statistics. Outstanding in importance and interest is "Is this 1947 all over again?" The answer seems to be, no. Three factors were involved in that unhappy shut-down of industry. Firstly, stocks were low at the power stations, and the demand for power was running at a high level because of the severe wintry weather. Secondly, that same terrible weather caused a prolonged interruption to all types of transport; and, finally, stocks of coal were not so distributed as to give perference to those stations which were particularly difficult to supply in bad weather. On this last point alone, little evidence is available.



Coal stocks at power stations in two critical winters

Even when the higher "normal" rate of electricity consumption today is considered, the 1947 situation has not been closely approached. The accompanying diagram shows the stock position at the ends of recent calendar months compared with corresponding figures four years ago. Most of the time a ratio of about two to one has existed. In 1947, the lowest point reached was 0·9 million tons at the end of the first week in February. At that level, special measures were taken, though an improvement in the weather later showed that these steps, though perhaps justified were, in the event, perhaps, unnecessary.

The present stock position has apparently been helped by the diversion of supplies from industry to the power stations during January. What has happened is somewhat obscure, but with industrial consumption running at about one million tons/week, a 15% transfer to power stations would have increased stocks by some 0·6 million tons above what they would otherwise have been at the end of the month.

As a result of these measures, and of the better weather in January compared with December, stocks are at something like 22 days

supply, which should be sufficient to tide-over any transport freeze-up during February or early March. If coal stocks continue to fall at the same rate as they did last year, then they will be 1·8 million tons at the end of April. This is equivalent to about 16 days supply at current rates of consumption, or 3 weeks at the probable May usage.

Basis for Estimates

Table 1 shows the consumption of coal during some of those December weeks that caused the Minister such surprise, and includes also the deliveries made, where the appropriate figures are available. Some comparison with the previous year is of interest in view of Mr. Noel-Baker's statement that "in one week electricity was 23% more than in the corresponding week a year ago." (The week was that ending on December 22.) These comparisons are given in Table 2.

These comparisons lead naturally to the second question—what factors have been effective in increasing the amount of coal used at power stations, and what increase was to be expected? The cold weather, of course, is the immediate evil, but its apparent effect may be modified by consideration of other factors.

Experience both in this country and in the U.S. is that the demand for electricity, when unrestricted continues to grow. A commonly assumed rate of increase is 7·5% per year, the compound interest law applying. This is a long term figure, and variations from year to year

TABLE 1. COAL CONSUMPTION AT POWER STATIONS

1950/51 Week ending	Consumption Thou. tons	Deliveries Thou. tons
Dec. 2	760*	—
Dec. 9	825*	—
Dec. 16	829	—
Dec 23	872	692
Dec. 30	721	458
Jan. 6	835	578
Jan. 13	802	683
Jan. 20	791	706
Jan. 26	762	784

* Estimated.

are naturally to be expected. Coal supplies, however, might well be planned on this basis while there is any sign of a shortage, so that stocks may be built-up in the relatively mild years to meet the excessive demand likely in cold winters and wet summers.

The difficulty with this "natural growth" idea is deciding where to start. For the 7·5% rate, the estimated coal consumption in 1950 varies from 35 million tons (1946 basis) to 32 million tons (1949 basis). Since 1946 offered a severe winter and 1949 was known to be mild, the 1947-48 values of 33 million tons may be accepted. This makes no allowance for improved thermal efficiency of generating plant. Actually, 32·9 million tons were used during 1950.

Next Winter

A third question concerns next winter. Working on a basis of 1·8 million tons in stock

TABLE 2. WINTER COAL CONSUMPTION WEEKLY AVERAGES

Month	1949-50 Thou. tons	1950-51 Thou. tons	% increase
November	667	737	10·5
December	679	806	18·7
January	702	798	13·6

at the end of April, then, to bring reserves up to six winter weeks at the end of October some 3 million tons or more will have to be stock piled in six months. Allowing for the rearmament effort, coal consumption for electricity generation is likely to be running at something like 610 thousand tons/week; so the average weekly supplies needed will be 725 thousand tons/week. Since other consumers of coal will also undoubtedly be increasing their demands, a very considerable effort is required from the N.C.B. and the opencast contractors to put the country on a safe footing. It is possible, of course, that the present emergency measures may result, as in 1947, in a more favourable stock position at the end of April, than is assumed above.

Industry's Contribution

Reasons for recommending a flat cut of 15% in industry's coal allocation were reviewed last week by Sir Norman Kipping, on behalf of the Federation of British Industries. He explained that a level cut, as against a priority scheme, would insure that everyone knew where they stood, and would help prevent unforeseen anomalies. With some co-operation between firms, this cut in supplies should not entail major breakdowns in production.

As an immediate palliative, the F.B.I. suggested to the Government that diesel generators owned by industry, and not in regular use, might be continuously operated if a regular supply of fuel oil were assured, and if the B.E.A. tariffs were adjusted to support such operation. This suggestion, which was favourably received, should bring some 250 MW of oil-operated plant into action.

Another suggestion made by the Federation was that the rail transport system should be examined to bring about a reduction in the total amount of coal in transit at a given time. This was stated to amount to about 4 million tons at any one time, and a total reduction of 100 thousand tons appeared possible.

The 275 kV Grid

B.E.A. announce details of Ten Year Plan

PLANS for the reinforcement of the grid have now been approved by the B.E.A. The scheme involves a 275/300 kV reinforcing network which runs from Glasgow in the north to the London area as well as east and west, as shown on the accompanying diagram. It is expected to meet the requirements up to 1960, and will be completed in stages. Operating voltage will be 275/300 kV, but certain sections (such as the Midlands-London) may be designed for ultimate operation at 380/400 kV.

Constructional work on the Staythorpe West Melton (Sheffield) section, which was put in hand some time ago, is in an advanced stage. The remainder of the scheme will be carried out in stages over a ten-year period, and contracts will shortly be placed for the sections required for commissioning by 1955. The detailed arrangements for interconnection with the 132 kV network and a number of generating projects are not yet complete, but it is intended that the greater part of the new grid lines will have been constructed by 1955. The first major extension to be undertaken will probably be the continuation of the Staythorpe-W. Melton circuit to Glasgow via Newcastle and Carlisle, to provide the extra capacity so urgently needed on the N.E. coast.

Map showing proposed development up to 1960

Route

The scheme provides for lines running from Glasgow in the north via Carlisle, Newcastle and Sheffield, to Staythorpe (near Newark on Trent) and thence to the London Area. From Staythorpe a line will run westwards through the East Midlands and extend northwards from a ring via Manchester, Blackburn and Leeds. From the East Midlands there will be a second main trunk line direct to the London Area and a further connection southwards via Birmingham will also link up with London via Gloucester and Melksham. There will be three main receiving centres on the north, west and south-west outskirts of London which will be interconnected and extended to form a loop round London from Tilbury on the north bank of the Thames to Littlebrook on the south bank.

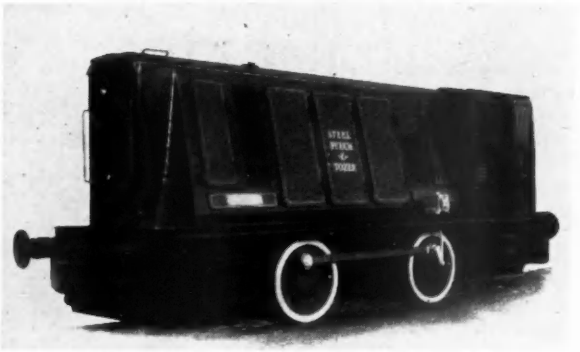
Background to the Scheme

It has, of course, been realised for some years that high-voltage reinforcement would be necessary not only to give maximum convenience and economy in operation, but to make possible future siting of generating plant at the most suitable locations, and preliminary consideration had been given before nationalisation by the Central Electricity Board. In the *Electrical Times* for March 2, 1950, a description was given of research work being carried out at the B.E.A.'s Leatherhead laboratories on the most effective conductor design. The Newark-Staythorpe section of line for which the transformers are being supplied by the British Thomson Houston Co., Ltd., and the English Electric Co., Ltd., was remarkable for some rapid tower construction work carried out by British Insulated Callender's Cables Ltd.

Steel Works Diesel-Electric Locos.

SPECIALLY designed for steel works duties is a new diesel-electric locomotive built by the Yorkshire Engine Co., Ltd., with electrical equipment supplied by the British Thomson-Houston Co., Ltd. Although unusual in appearance, being four-wheeled, this is excellently suited for negotiating the sharp curves and for withstanding the severe shocks encountered in such arduous duties.

The power unit is a Davey Paxman 6-cylinder engine developing 230 b.h.p. at 1,250 r.p.m., solidly coupled to a B.T.H. d.c. generator of the three-winding, self-ventilated type. Each pair of wheels is driven by a B.T.H. reversible series-wound, self-ventilated traction motor, through a double reduction gear of 19·75/1 overall ratio, housed in an axle-borne, oil lubricated gearbox.



External appearance of steel works locomotive

The motors, of the spring-loaded nose-suspension type, are placed longitudinally between the main frames and are hung outwardly on the axles through the gear box ends.

Control has been simplified by using a single lever system regulating the engine speed. Initial movement of this lever excites the generator, and further movement increases the engine speed up to the maximum. After this point, field weakening of the traction motors is introduced under relay control. Reversal is by means of a pneumatically operated reverser. This simple control is achieved by using the three winding generator, which has self-excited and separately excited shunt fields and a differential series field. Such a machine has an inherently drooping characteristic which cuts the constant h.p. curve of the engine at two points. It can thus overload the engine, but, owing to a maximum fuel control, the engine will slow down when this occurs. This reduces the separately excited field and balance is restored.

Speeds up to 25 m.p.h. are possible, with a starting tractive effort of 24,000 lbs. representing 24% of the total weight of 44 tons of the locomotive.

Expanding Electrical Production

THE considerable expansion that occurred in the general electrical engineering trade between 1935 and 1948, is indicated in returns just published by the Board of Trade. These statistics are obtained from the first preliminary results of the Census of Production for 1948. In that year, the total value of sales of the firms employing more than 10 persons amounted to £218,083,000, compared with £148,997,000 in 1946, £71,814,000 in 1937 and £54,267,000 in 1935. Finished products and work in progress in 1948 and 1946 amounted to £51,126,000 and £35,625,000 respectively, while the value of work in progress was £10,722,000 in 1937 and only £5,942,000 in 1935.

The total value of production of the gross output is put at £225,629,000 for 1948, and £155,514,000 in 1946, a considerable increase over the totals for 1937 and 1935 which were £75,520,000 and £55,846,000 respectively.

Cost of materials, fuel and electricity used in the years, by the establishments covered in the return, also rose proportionately, for 1948 the sum being £97,284,000, against £60,838,000 in 1946, £33,229,000 in 1937 and £23,216,000 in 1935.

New plant and machinery acquired by the firms during 1948 were valued at £5,056,000.

These returns relate to firms wholly or mainly engaged in the manufacture of generating plant, transformers, dynamos, motors, switchgear, electrical equipment for motor vehicles and other goods. The 1948 figures relate to 855 concerns, who employed a total of 253,677 persons, to whom wages and salaries paid in that year amounted to £77,643,000. Of this sum, £54,454,000 went to the 193,582 operatives, and £23,189,000 to the 60,095 employees on the administrative technical, and clerical staff. In 1946 a total of £63,731,000 was paid in salaries and wages to the 244,910 persons employed, but completely comparative figures for the other years are not available. Employees in 1937 totalled 177,321 of whom 136,033 were operatives, and in 1935 there were 148,957 employees ,117,621 of whom were operatives.

Meteorological Measurements

RECENT DEVELOPMENTS USING ELECTRICAL METHODS DESCRIBED AT I.E.E.

THE importance of accurate measurement of meteorological conditions can hardly be over-stressed in these days of high-flying aircraft. Beside the necessity for weather-forecasting, however, measurements of wind pressure and wind flow are also required for gunnery purposes, flying aircraft off carriers, and in the design of buildings and other outdoor structures. Finally, in a specialised field, wind measurements are required for the exploration of the potentialities of wind-power for large-scale generation of power.

In view of these requirements, it is but to be expected that modern developments in electronics should have been applied with considerable success to the problems involved, and the extent to which these methods are being used, was well illustrated in the Symposium of Papers on Electrical Meteorological Instruments held at the I.E.E. on Jan. 30.

Wind Measurements

Fundamentally, in all problems of wind measuring, it is necessary to know two things : the velocity of the wind and its direction. Originally two instruments satisfied these requirements; the well-known cup anemometer and the wind-vane. When, however, it became necessary to carry out a wind survey for electricity generation purposes, the remoteness of the sites concerned, which implied only periodical attendance at comparatively long intervals, and the necessity for obtaining data dealing with gusts, led to the development of automatic recording instruments with a high-speed response. The cup anemometer was found to be too sluggish and in consequence a perforated sphere anemometer was designed, [1] using a transductor to convert the sphere movement into electrical readings. These readings were recorded by a servo operated pen driven by a valve amplifier. This type of anemometer can be modified to give readings of wind velocity resolved into two horizontal components at right-angles and a separate instrument using the same principles can be used for vertical measurements.

Naval requirements, while not so strict with regard to gust response, are complicated by the introduction of a third parameter—the apparent wind speed due to the velocity of the ship on which the measuring equipment is located. Two systems for carrying out the appropriate analysis automatically were described. One utilised an anemometer system consisting of a fan-driven generator orientated by a double paddle wind vane. A revolving system, fed with the ship's speed and direction and the wind speed and direction (relative to the ship) automatically gave continuous readings of the true wind speed and direction [2].

Of more complexity, and designed to give mean-velocity readings, was a system developed utilising magslip transmitters, induction potentiometers and generators and with a final servo motor output. [3] This had the advantage of using standard items of gunnery equipment.

A further paper devoted to wind measurement [4] described the development of electrical anemometers, recorders and wind vanes. In this case, however, the equipment was required for general use and in consequence retained the cup-type form, although electrical equipment recorded the actual measurements.

Building Research

Although at first sight, the connection between building research and meteorological measurement might not appear great, climatic conditions are nevertheless of a considerable importance. Variation in air-change rate is largely due to variation in wind pressure, and again both the run of wind and direction need recording. Another important factor is the measurement of equivalent air temperatures to enable the heat losses through walls and ceilings to be measured, and the temperatures need to be integrated and averaged.

The paper dealing with this subject [5] was of considerable interest, as the equipment described largely utilised standard G.P.O. equipment, and considerable use was made of relays, telephone selector switches (uniselectors) and telephone counters. This was mainly due to the necessity for the instruments to operate for long periods without supervision. The actual measuring equipment was fairly standard, using a cup-type anemometer for wind velocity, a Mark IIA wind-vane for direction. Thermocouples mounted in compressed graphite were used to give temperature readings in the N, S, E and W directions and also in the

vertical plane, and again G.P.O. technique was used to provide the integrating function in a 0-120° F. 12-point self-balancing recorder. In the particular unit described, 100 readings equally spaced over a week are summed for each of 44 temperature points and the mean values can then be obtained directly by shifting the decimal point two places.

High Altitude Measurements

Probably the field in which electrical equipment must of necessity play the greater part is that of investigation of conditions in the upper atmosphere. This is done principally by radio-sondes, small transmitting units which are carried into the higher altitudes by balloons.

The present radio-sonde, however, suffers from several defects : the batteries are exposed to low temperatures and their performance is thus largely unpredictable; wind driven switches used for selecting the elements to be measured, cease to operate at high altitudes where the pressure is low; the machinery needed to produce the intelligence requires high-precision manufacture, and the telemetering accuracy is not great.

Consideration was thus given to a radar-sonde [6], which by emitting its own signals could be tracked for great distances and which would transmit its information in the form of coded pulses.

It was decided to embody a transponder system whereby a ground transmitter giving a peak pulse of 70 kW on a wavelength of about two metres at a repetition rate of 400 pulses per sec. would trigger a transponder in the sonde which would retransmit pulses on a wavelength of 10.7 cms. These retransmitted pulses would have to give two indications, one a range and the other a measurement of the parameter being investigated. Thus two pulses were required for each one received. One of these was required immediately (or at least after a short known delay) and the other after a time which was a function of the parameter being measured. Although this may seem difficult of accomplishment a complete telemetering equipment weighing only two oz. was developed. Switching was made independent of wind driven devices by using a telephone counter type mechanism actuated by a solenoid controlled ratchet. Power for the solenoid was provided via a bi-metallic strip arranged to act in a similar method to a "flasher."

Batteries of course, had to be carried, and at present wet cells of the "unspillable type" with lead peroxide/zinc plates and using sulphuric acid as an electrolyte provide both h.t. and l.t.

The whole sonde, with the exception of the temperature and humidity elements and aerials, is housed in a case of Onazote—an expanded-ebonite material—which keeps batteries and circuits at approximately ground ambient temperature, the heat losses being made up by the heat radiated from the valves.

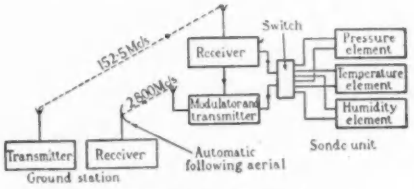


Diagram of radar sonde equipment

Ground equipment follows fairly standard practice. Owing to the fact that waves from the sonde are vertically polarised, the dipole in the transmitter-receiver parabola must nutate; i.e., although the centre of the dipole describes a circle round the centre of the parabola, the dipole itself remains in a vertical plane. Range is automatically measured by arranging for a strobe, when locked on to the wanted signal, to develop a voltage which is proportional to the time of transit of pulses to and from the sonde. As at any moment the slant range, bearing and elevation are available from the receiver, a magslip resolver unit can be used to compute the wind velocity in plan position. A gating circuit is used to separate the ranging and meteorological pulses.

Finally a paper [7] was given describing an automatic frost-point hygrometer for measurements in the upper air. This utilised a photo-electric cell system to view the deposit of hoar frost, with a closed loop servo-mechanism to feed back heating to keep the deposit at a certain intensity.

Papers Read

1. "Wind- and Gust-Measuring Instruments Developed for a Wind-Power Survey," by H. H. Rosenbrock and J. R. Tagg.
2. "An Electrical Method of Resolving True Wind Velocity aboard Ship," by H. D. Hawkes and J. M. Laws.
3. "Mean-Wind-Velocity Instruments for use on Naval Craft," by J. Bell and E. M. Langham.
4. "The Development of Electrical Anemometers," by G. E. W. Hartley.
5. "Some Meteorological Instruments used in Building Research," by A. W. Pratt, B. G. Collins, R. E. Lacy, and E. W. Spink.
6. "The Radar-Sonde System for the Measurement of Upper Wind and Air Data," by F. E. Jones, T. E. N. Hooper and N. L. Alder.
7. "An Automatic Fros -Point Hygrometer for Measurements in the Upper Air," by A. W. Brewer and R. H. Dodson.

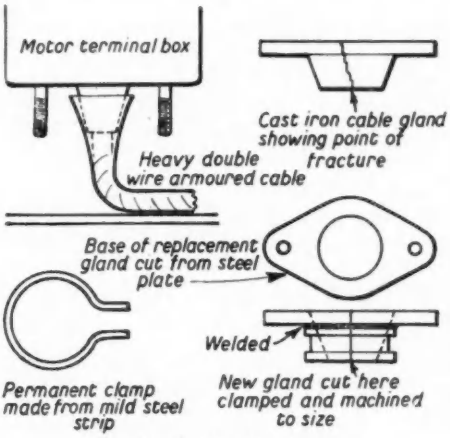
Problems and Practice

IN ENGINEERING

Gland Failure

THE clamping portion of a large cable gland composed of cast iron was found split in two, possibly due to the efforts of an over-zealous motor attendant armed with a long spanner. The cable in question was approximately 3 in. in diameter, double wire armoured, and supplied a motor driving almost continuously running plant. From the production angle, a shut-down to replace such a trivial fitting as a cable gland was unthinkable.

A temporary bonding clamp was fitted, and consideration given to ways and means of fitting a new clamping gland. To remove and replace a large cable for the sake of fitting another unreliable cast iron gland seemed waste of time and labour. Therefore, a gland, as sketched, was fabricated from mild steel sheet and a short portion of steel shafting. The flange was cut out by oxy-acetylene flame, the portion of shafting rough bored, and a recess turned on the outside to take a clamping strap. After welding the shafting to the flange, the rough gland was cut in two vertically and clamped together by means of the previously

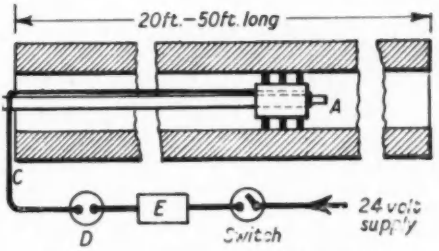

Motor terminal box
Cast iron cable gland showing point of fracture
Heavy double wire armoured cable
Base of replacement gland cut from steel plate
Welded
Permanent clamp made from mild steel strip
New gland cut here clamped and machined to size

Details of cable gland repair

prepared mild steel clamp. Using the bore of the fractured cast iron gland as a guide, the fabricated gland was set up in the lathe and bored to match. The flange holes in the new gland were also drilled to agree with the old gland. When finished, it was a simple matter to assemble the new gland round the cable and bolt it in position without any shut-down, plus the satisfaction of having fitted an unbreakable gland.—*F. S.*

Lighting on Boring Machines

WHERE long cylinders have to be bored it is very helpful to the machine attendant when a source of light is provided to move along the cylinder with the boring bar. A typical example of this type of machine is to



Lighting arrangements for boring machine

be found in a workshop where gun liners and cylinders are machined. In a case which came under the writer's notice a 240 V, 16 c.p. lamp "A" was fixed to the front end of the boring bar "B," the lamp being connected to the source of supply by means of a length of three-core cab-tyre cable "C," together with a suitable plug and socket "D." The cable was clipped to the boring bar at regular intervals and allowed to travel throughout the entire length of the cylinder or liner undergoing the machining processes.

It was found on several occasions that the lamp was broken, sometimes due to cuttings or perhaps undue vibration. In any case, when a lamp of this size broke it was generally found that a mark was made on the cylinder and this was undesirable, especially if it should happen to be the finishing cut. To overcome this difficulty a smaller voltage lamp was fitted, an 8 V finger type proving quite satisfactory.

This voltage was obtained by providing each boring machine with a separate transformer "E," wound for stepping down from 240 to 8 V. In practice it was found that when a

lamp of this type broke in the process of machining operations, no undue marking of the cylinder occurred.—*M. I. C. E.*

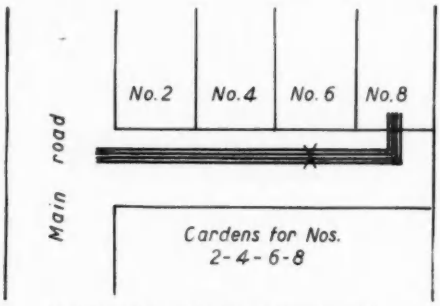
Broken Fluorescent Tube

A REPORT was received from a works office that on switching on a standard pattern 80 W 5 ft fluorescent lamp the tube had exploded and the pieces had cut a girl across her hand.

Upon careful investigation when the girl returned it was found that the tube had not exploded at all. The lamp was operated by a pull cord ceiling switch. The cord was found to be knotted and shortened. The girl was also short and so, in switching, she had to reach high for it and pull more vigorously than normal. Upon release from her hand, the knob had wound itself round the fitting and then hit the tube, smashing it. The knot was removed from the cord and instructions given to leave it alone, and a new tube fitted to the lamp.—*A. J. Scadding.*

Lost Phase

I WAS asked to ascertain a fault on a service lift in a block of flats. The motor driving the equipment was designed for a three-phase supply, which was given from the usual



Position of short in 4-core supply cable

three-phase, four-wire supply. On examination I found the motor very much overheated. It would not start and the hum gave the impression of the usual single-phasing. Further tests with a voltmeter recorded full voltage between all phases to earth or neutral, but between phases, full volts between phase one and two, also full volts between phase one and three, but no volts between phase two and three. There were four flats in the house, each having single-phase lighting and heating and the supply to each flat was normal at all times. I would state this house was the end house of a cul-de-sac. I notified the supply authorities who, after a good deal of mains testing, discovered a fault in one of their joint boxes in the road. A blow-out had disconnected phase three and joined the end at the break to phase two, so giving a normal single-phase supply to all consumers at this house. The accompanying sketch shows the position of house in relation to the road where the cable was laid.—*A. V. Jones.*

Vibration of Turbo-Alternator

SOME time ago I was called in to investigate the cause of vibration taking place on a 750 kW 3,000 r.p.m. 400 V 3-ph 50 c/s turbo-alternator supplying a factory load. At first the vibrations had taken place only on occasions and were very brief in duration, but later they had occurred more frequently, sometimes continuing for two or three minutes at a time, causing grave concern.

Suspecting that an intermittent short-circuit was taking place on the rotor windings, as the vibrations were on the alternator end of the "set," it was arranged that the attendant would take note of the excitation current readings next time the vibrations came on. It was found that the excitation current increased from the normal 125 A to about 150 A when next the vibrations occurred, making it fairly obvious that there was an intermittent short circuit in the rotor windings causing unequal current distribution in the two poles, which, in turn, caused unbalanced magnetic forces to be set up resulting in the vibrations experienced.

The rotor was of the non-salient pole type with slots spread over two-thirds of the pole pitch and had heavy copper strip windings wound on the flat and, on removal of the end binders and lifting a few turns, it was found that solder from a joint had run and burnt through the insulation tape of a conductor forming part of the next coil. There were distinct signs of arcing on the copper making it clear that only on occasions would an actual short circuit have been taking place.

The machine had been in service some 25 years and, as would be expected, the inter-turn insulation was very brittle causing it to fall away when disturbed. However, as the stator, exciter, and also the turbine were all in reasonably good condition, it was considered worth while to have the rotor completely rewound. In line with modern practice it was specified that where joints were necessary they should be brazed, not soldered.—*S. Woodhouse*, A.M.I.E.E.

JUBILEE DINNER OF THE E.C.A.

1901 President Among the Guests

THE attendance of the founder of an Association at its jubilee dinner must surely be unique, and we believe that history was made on Tuesday

Sir Henry Self, Mr. Rawlings, Dame Caroline Haslett and the President

of last week when MR. W. R. RAWLINGS, A.M.I.E.E., first President of the "National Electrical Contractors Association" in 1901, attended its golden jubilee dinner as an honoured guest.

First duty of the RT. HON. R. A. BUTLER, M.P., who proposed the toast of "The Allied Associations and Honorary Officials," was to deliver a message of congratulation from Mr. Churchill. Referring to the aims of the E.C.A., he pointed out that the achievement of high standards was of first importance for the future. He commended to them the importance of absolute unity within their ranks, in order to face successfully the hazards of the future.

Referring to the "marriage" between the Area Boards and the contractors, he pointed out that if the agreed principles between the two were not applied fairly, many private traders would be ruined by unregulated competition from a monopoly whose basis of overhead charges was, at times, extremely low.

Despite national appeals to reduce domestic consumption, the Boards were giving terms unapproachable by private traders. From any point of view, hire purchase schemes were not in the national interest. What was in the national interest was that the nationalised industries must work well. The B.E.A. had great power, which they must take care not to abuse.

Replying to the toast, the President, MR. P. G. WALLIS, ASSOC.I.E.E., reviewed the milestones in the history of the E.C.A. and its allied associations, N.E.C.T.A. and N.F.E.A., its growth from a few dozen members in 1901 to more than 3,000, attached to 82 branches, who carried out some 80% of the reputable contracting work in this country. The E.C.A. had been responsible for setting up, as far back as 1916, of the first Whitley Council, forerunner of the N.J.I.C. It was, incidentally, a source of regret to the N.F.E.A. that the Area Boards did not all observe rates, rules, and conditions that the N.J.I.C. had established.

In welcoming the many manufacturers present, the President pointed out that E.C.A. had been largely responsible for the publication of the Fair Trading Policy in 1936, although N.E.C.T.A. had in fact published a trading policy as far back as 1922.

The most concentrated efforts, however, had been in the field of labour training, he said, and he instanced schemes for part-time release of apprentices to attend technical classes, and referred to the industry's new training scheme which had superseded the N.F.E.A. indenture. In view of their devotion to the training of apprentices, it was disturbing to receive a claim from the union that in future apprentices should not be employed in larger numbers than one to every five journeymen. Replacement of apprentices by unskilled mates would tend towards lowered standards of workmanship.

Observations during the last few years had shown that in all industries there was a growing tendency to concentrate on the clock and the pay packet with little or no thought of giving a fair day's work for a fair day's pay. One factor, he was sure, was the governmental technique of creating jobs for men to fill, and the present welfare state bade fair to become a "farewell" state if the present reckless extravagance continued. With more and more people becoming executives in the State machine there would soon be no one left to empty the dustbins. He concluded his speech with a tribute to the part which Mr. L. C. Penwill had played in building up the E.C.A., and welcoming the Association's first President.

MR. W. R. RAWLINGS, A.M.I.E.E., first President of the E.C.A. in 1901, said that it was difficult to realise that the E.C.A. had now 3,000 members

instead of counting them in units. Age of necessity crept on one—he was now nearly 88—and one of the sixteen surviving Presidents out of the thirty-five since its inception, and he could remember the platinum-filament lamp and the first accumulator. Age, however, had its compensations, as well as its disadvantages. The E.C.A. was an organisation to be proud of; it was with feelings of pride that he sat down that night.

Regrets for the absence of Lord Citrine were made by MR. STANLEY N. WATKINS (Vice President, E.C.A.) in proposing the toast of "The Guests." He was, however, pleased to welcome Sir Henry Self, and paid a tribute to his fair dealing and clearness of understanding.

Replying to the toast, SIR ARCHIBALD GILL (President, I.E.E.), referred to the long and honourable record of the E.C.A. It was interesting to learn their aims and objects in the field of training, in which field the I.E.E. were also interested. Any efforts to return to a higher grade of workmanship were worth while. Referring to the question of electrical accidents in the home, Sir Archibald pointed out that those due to faulty wiring by a reputable contractor were practically nil—the amateur was the culprit in every case.

SIR HENRY SELF (Deputy Chairman, B.E.A.), said that he felt like Daniel in the lions' den, after some of the forthright comments made on the B.E.A. Mention had been made of the "marriage" between contractors and the B.E.A.—it was high time that the marriage was consummated. The B.E.A. was tired of being regarded as a mother-in-law, it wanted to be one of the partners. Pointing to examples of B.E.A.'s own work put out to private contractors, Sir Henry said that if there were a little more give and take and a little more trust in each other, the awful spectre of the mother-in-law would disappear.

MR. S. B. FLETCHER, M.I.Mech.E., proposed the toast of "The Chairman."

The jubilee was marked by a record attendance. In spite of gaps in the ranks caused by illness, 750 members and guests were present.

ALTERNATOR OPERATING CHARACTERISTICS

PROBLEMS of synchronous generator operation were discussed with reference to the theory of the machine by MR. P. D. AYLETT, B.Sc.(Eng.), A.C.G.I. (Development Engineer, S.E. Division, B.E.A.), in a paper which he read before the I.E.E. London Students' Section last week. Direct (X_d) and quadrature (X_q) reactances of alternators were first considered, the Author defining those values as the current phase over the reactive voltage induced in the phase windings by the rotating wave of armature flux when the axis of the flux wave is along the axis of the field winding, and when it is at right angles to it, respectively.

Transients and Unbalance

After a discussion of the current/flux relationships for steady state operation, the effect of transient conditions and unbalanced loading were considered. When a machine is suddenly short-circuited, the air gap flux cannot change instantaneously, and the increase in current in the armature is countered by induced currents in the rotor circuits. These currents are d.c. transients decaying exponentially.

Unbalanced operation results in the application of negative phase sequence currents to the armature windings, with an M.M.F. of constant magnitude rotating with synchronous speed in the opposite direction to the rotor. As a result second harmonic currents are induced in all closed rotor circuits. Thus the case is similar to that for a sudden short-circuit, except that the induced rotor currents are now a.c. and are maintained. Since there are no field windings in the quadrature axis, and the axis of the negative sequence armature currents are moving relative to the field, the reactance of each phase winding is varying. There is no field winding in the quadrature axis, so that X_q'' may differ from X_d'', particularly in salient pole machines. Zero phase sequence currents of fundamental frequency will produce no resultant fundamental space M.M.F. wave, and so the rotor will have little effect on zero phase sequence reactance (X_o). The value of X_o, however, does depend critically on the spread of the phases and the chording of the winding, and varies considerably from machine to machine.

In normal operation, there is a maximum power that can be transmitted to the busbar, and this is determined by the generator excitation voltage, the busbar voltage and the machine reactance. For any given power output there is a critical value of field current below which the machine will not maintain synchronism.

Asynchronous Generation

A particularly interesting condition arises if a generator carrying load and connected to its power system loses its field through some defect. The rotor will be accelerated and the machine come out of step, but the armature windings will continue to carry balanced fundamental currents, slip frequency currents being induced in the rotor. Eventually, the machine will operate at 2% to 4% carrying two to three times full load current and supplying perhaps 80% full load. Such a synchronous operation must not be allowed to continue for long because of the danger of rotor overheating.

Notes on Wiring
by MEGOHM

Multiway Socket-Outlets

A plea for fewer adaptors and more switches

OLDTIMERS will recollect the early days when it was usual to install three-plate ceiling roses and bridge two of the connections with a piece of fusewire, thus having a separate fuse for each lighting point. The many disadvantages of this method, not least the risk of fire, soon became apparent, and the regulations then prescribed that the proper place for a fuse was on a fuseboard. Later again, as improved methods of manufacture produced totally enclosed fuses of the cartridge type, certain relaxations in the regulations allowed fuses to be fixed in socket-outlet adaptors and plug tops, or in readily accessible positions, subject to certain safeguards. And that, in fact, is the position today.

Insufficient Outlets

If we consider the matter, I suspect that the latter relaxations were dictated by the necessity for some action to combat the introduction of the various types of adaptors which transformed an ordinary 5 or 10 amp socket into a veritable multipoint distributing centre. In fact, even today, one can happen upon a shop window where the various points are fed from one outlet by means of a bank of three-way adaptors arranged so that two points are taken, one from each end, and the centre outlet contains the next adaptor, and so on. This obviously is most unsatisfactory and leads to overloading and bad connections.

The remedy then, as has so often been said before, is to install a sufficient number of socket outlets so as to cater for all foreseeable requirements, and if we are dealing with a shop window, where for some reason or other permanent points cannot be installed, then it is usually not difficult to install a fuseboard near the window and feed the circuits direct from that point.

In a private house installation it should not be difficult to decide upon the minimum number of outlets required, and with the introduction of the 13-amp multi-purpose socket outlet the drawback of using two or three non-interchangeable sizes has been overcome. We also have the advantage there, that a very large diversity is certain, as the occupants are usually few in number and their activities are mostly confined to one room at a time.

The question of installation cost naturally has a bearing on the problem, and to assist in this respect various manufacturers and others have advocated greater use of units consisting of two- or three-gang socket outlets which can be connected direct to the fixed wiring. This is a helpful solution towards increasing the usefulness of an insufficient installation and in many instances is even preferable to having separate simple sockets some distance apart.

Outlet Adaptors

I must therefore confess that I view with a certain measure of disfavour the continued development of "adaptors" of the multi-outlet type by our various manufacturers, particularly those of the 13-amp size. Admittedly, one manufacturer at least has introduced a 13-amp fuse so as to limit the current which can be taken from the outlet, but this may be a complication as a plug with the same sized fuse may be connected to the adaptor, and both or either of the fuses may then blow in the case of a short-circuit.

The unsuspecting consumer may also be tempted to plug in, perhaps, a 3 kW fire, or kettle and a toaster which would amount to some 16 amps in all. The fuse might carry this load, but the contacts of the socket outlet would be overloaded by over 20%.

This brings us to the side issue of switches, and I should like to see a standard arrangement for combined switch-sockets, as I do not consider that a plug top adequately discharges the function of a switch. Kettles, irons, toasters and similar appliances do not usually contain a switch, and those sockets from which they are used will get a certain amount of extra wear.

Furthermore, if no switch is fitted, flexes for standard lamps, radio receivers and similar items fitted with a switch will be left live more or less permanently and, being perhaps the most vulnerable part of an installation, accidents are apt to occur now and again. As a general principle I prefer switch control for all socket outlets, except those which are only disconnected at infrequent intervals.

Progress in Production

Further Reports show Progress in the Gas Turbine Field, and confirm Increasing Demand for Heavy Plant

No. 5. Metropolitan-Vickers Electrical Co. Ltd.

WITH the maximum demand still placed on the production of large generating units for power-station use, the aggregate power of new Metrovick turbo-generator sets put into commission for the B.E.A. during 1950 was 460,000 kW, an increase of some 60% over the 1949 figure.

Large machines, included the second 60 MW machine with reheat, for Littlebrook, two 52·5 MW sets for Croydon, the fourth and fifth 45 MW sets for Ipswich, 50 MW sets for Neepsend and Poole, and two 52·5 MW units for Agecroft. A 75 MVA hydrogen-cooled generator for the 60 MW set for Battersea was tested in the works at a wattless load of 54 MVA and has now been erected on site. This machine and also the 62·5 MVA generator for Poole were fitted with gear-driven exciters running at 1,000 r.p.m.

Overseas turbo-generating units have been put into commission in Egypt and Rhodesia, and four 25 MW 22 kV sets have been dispatched to South Fremantle.

Orders for overseas have been most satisfactory. Two further 30 MW back-pressure sets have been ordered by the S.E.C. of Victoria for Morwell briquetting works, making five in all. The turbines will operate at 1,200 lb/sq in., 915° F and will exhaust at 28 lb/sq in. to the coal-drying plant. A 7,500 kW set has been ordered for Clarence River, N.S.W., and South Africa is represented by two 20 MW sets for Salisbury and three 15 MW sets for the Nchanga copper mines of the Anglo-American Corporation.

Gas Turbines

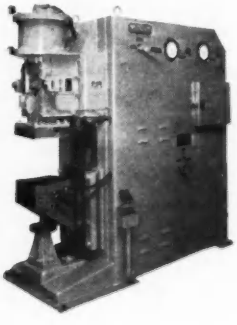
Manufacture of the 15 MW set for the Trafford power station of the B.E.A. is well advanced. The intercoolers and heat exchangers have been delivered on site and the generator has also been dispatched. A 2,000 kW gas-turbine generator set for the Ministry of Fuel and Power will operate on producer gas. This plant is similar to those in hand for the Metropolitan Water Board and Shell Petroleum and is designed for continuous operation. The set, together with the gas producer plant designed by Joseph Lucas and the Incandescent Heat Co. will be installed at the M-V Barton works where it is to be used for development testing.

Other Generators

The third 18 MVA 75 r.p.m. vertical shaft generator for Tainionskoski, Finland, was erected early in the year, and the whole station has been brought into service. Two of the three 32 MVA 428 r.p.m. horizontal shaft generators for Cavado, Portugal, have been completed. (These form part of an extensive contract being executed jointly with the English Electric Co.) Further vertical shaft generators now completed are the first of three 14,100 kVA 428 r.p.m. machines for Moyar in Madras, and the second 8,333 kVA 167 r.p.m. machine for Kaplan turbine drive at Pitlochry in Scotland.

Among new orders for vertical shaft generators are three machines of 82·5 MVA running at 214 r.p.m. for Saltos del Sil, Spain, together with the associated transformers and switchgear; these generators are a record size for British manufacturers. Four machines of 27,777 MVA 136 r.p.m. have been ordered for Whakamaru, New Zealand, and two of 17·1 MVA 650 r.p.m. for Kiewa, Victoria. Four similar orders are already in hand for this scheme.

Three synchronous condensers of 30 MVA 1,000 r.p.m. were completed and dispatched to



This specially designed tool is a single-head production welding machine (600 kVA) for use in the construction of the front suspension cross members of motor cars.

Spain. Thirteen large machines of this type, aggregating over 300,000 kVA, are now in course of manufacture, among them a 40 MVA condenser for Australia, and a 15 MVA 1,000 r.p.m. a.c.-a.c. motor generator set giving a single phase output of 10,000 kVA for transformer testing.

Transformers

The year has been a record both in respect of plant made and shipped and of new orders received. Among large 3-phase generator transformers installed for the B.E.A. was a 66·67 MVA 11/66 kV unit commissioned at Fulham, two 60 MVA 11/132 kV units with on-load tap-changing gear at Croydon, and one of 62·5 MVA 11/35 kV for Neepsend, Sheffield. Four 132/33 kV 3-phase transformers have been supplied for main B.E.A. substations—two 45 MVA to Willesden and two 60 MVA to Wigan.

Shipments abroad included large transformers for the Portuguese hydro-electric stations: three 3-phase units rated at 52·5 MVA, 15/165 kV were for Castelo do Bode, and two 3-phase groups of 30 MVA 10·5/165 kV units for Cavado.

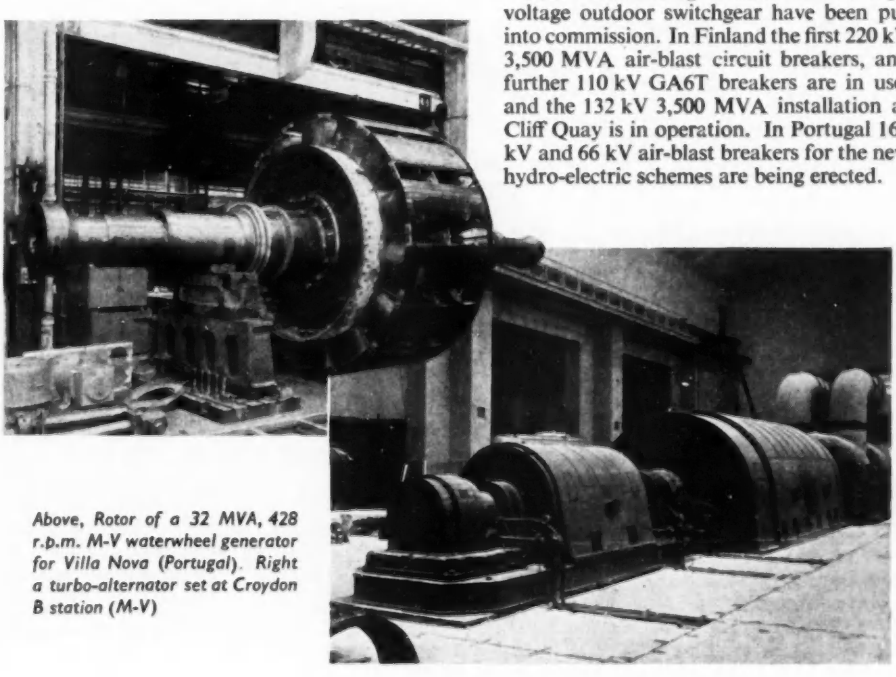
Large orders have been received both from home and abroad. The South Western Division have ordered 72 MVA and 6 MVA units, and the North-Western have two 45 MVA, two 36 MVA, and two of 6 MVA. Area Boards have 15-33 kVA transformers on order, four of 10 MVA in the North-Western Area, two of 7·5 MVA in the Midlands, four of 7·5 MVA in the East Midlands, and five of 5 MVA in the East Midlands. Many transformers are also on order for abroad, including units for India, New Zealand, South America, Tasmania and Australia.

Rectifiers and Switchgear

The second 1,500 kW 500 V pumpless steel tank rectifier has been commissioned at Templeborough Rolling Mill, Rotherham, and also a 1,000 kW unit at Barrow Ironworks. Several glass bulb rectifiers with a new type of cubicle have been installed, some of these incorporating grid-controlled equipment.

Among the large number of orders received is one for two 2,500 kW 3,000 V continuously pumped water-cooled units for the Central Railway of Brazil, and a grid-controlled unit rated at 1,650 kW 0/500 V for use with a proton-synchrotron for the National University of Australia. This rectifier will be used for accelerating a motor-driven homopolar disc-generator through a precise speed cycle.

Some outstanding installations of high voltage outdoor switchgear have been put into commission. In Finland the first 220 kV 3,500 MVA air-blast circuit breakers, and further 110 kV GA6T breakers are in use, and the 132 kV 3,500 MVA installation at Cliff Quay is in operation. In Portugal 165 kV and 66 kV air-blast breakers for the new hydro-electric schemes are being erected.



Above, Rotor of a 32 MVA, 428 r.p.m. M-V waterwheel generator for Villa Nova (Portugal). Right a turbo-alternator set at Croydon B station (M-V)

Below is the magnet of a 300 MeV synchrotron for Glasgow University, being erected in the M.V. research labs. Right is a high speed inter-urban train on the Netherlands State Railways (M-V)

Outdoor o.c.b's of the tank type include ten 132 kV 2,500 MVA units, with a breaking time of three cycles, and five 66 kV 500 MVA units to be supplied to Hirakud in Central India.

Many smaller installations are in course of erection or on order both for home and abroad.

Industrial

Large induction and synchronous induction motors have been ordered to a total of about 120,000 h.p. output. Most are of the standard type, but machines with closed air-circuit ventilation and water-cooled air coolers are being increasingly made. In the field of electronic control gear repeat orders for motor control equipments show that reliability, one of the early criticisms, is proving satisfactory in practice. Collaboration with machine tool manufacturers has led to some highly important developments in control and automatic following equipment.

Resistance welding machines are becoming increasingly popular and several specialised installations are being built.

Industrial heating is exemplified by the demand for high frequency a.c. generators with outputs ranging from 60 to 650 kVA at frequencies from 1,500 to 10,000 c/s. Many of the more usual type of resistance and induction furnaces have also been built or are on order.

Transport

Work is well advanced on the installation of the electrical equipment on the 58 mixed traffic locomotives for the Manchester-Sheffield line of British Railways. Considerable progress has also been made with the 3,500 h.p. six-axle gas-turbo-electric locomotive for British Railways, and successful tests have been carried out on the turbo-generator unit.

The latest of several important orders for railway equipment overseas is for 48 eight-axle 1,100 h.p. diesel-electric locos for Western Australia. Electric locos have also been ordered by New South Wales and Brazil.

Road vehicle equipment completed included over 100 trolleybus electrical installations. Ship's turbine propulsion machinery consisting of two 8,000 h.p. geared turbines has been ordered by Caledon Shipbuilding and Engineering Co. for two vessels of the Holt Line, and numerous auxiliary items of ship's equipment have been supplied.

Scientific and Medical

A synchro-cyclotron, the largest in Europe and one of the largest in the world, has been designed for Liverpool University and is in process of construction. The magnet of this machine weighs 1,800 tons and its overall dimensions are 32 ft by 22 ft by 13 ft. It will be used for the acceleration of protons up to 4 MeV and can also deal with deuterons and other positively charged particles. The 300 MeV synchrotron for Glasgow is now being tested.

Medical equipment now includes the "linear accelerator" for X-ray therapy, and a 10 MeV unit is being built for Hammersmith Hospital. Tests show that 250 roentgens/min are possible with this equipment.

Help for "Mine Host"

Mancunians get preview of latest catering aids

SECOND exhibition of its kind to be held outside London, the bi-annual Hotel and Catering Exhibition was opened last week in Manchester's City Hall by the Earl of Derby, M.C.

This event, awaited by many leading manufacturers, as a suitable occasion on which to introduce their latest products, is sponsored by the principal associations in the Hotel and Catering Exhibition. It features this year the special displays of some 130 exhibitors.

The academic side of the catering industry, as Lord Derby pointed out, is not being overlooked at the exhibition, there being many lectures arranged by the various bodies during the session. However, most important from our viewpoint is the wealth of equipment which is new, many items being on show for the first time.

The Arora Co., Ltd. of Loughborough are displaying "unit" type equipment, the latest addition to the range being the toaster griller hot-cupboard illustrated. This comprises a ten-slice toaster griller complete with hot-cupboard. It is equipped with three-heat switch control for the toaster griller and Simmerstat for the hot-cupboard; finish is in aluminium enamel with black reliefs and stainless steel.

Crypto Ltd. are displaying representative examples from their vast range of equipment, interesting examples are the "Aquafont" automatic water boilers and the food preparing machines.

Jackson Boilers have on show a new electrically heated stillroom set. It is interesting to note that this company has supplied a large number of single boilers for ships of the Royal Navy. Hoover's show their latest range of cleaners and the "Glassmaster," which, since making its debut last year, is in great demand.

For keeping in touch with all branches of the caterer's organisation, Communications System Ltd. have perfected many sound distribution amplifying systems. Interesting, too, is their range ofcoin-operated radio sets for hotels.

Above is Simplex's new Creda Unity range on view on the N.W.E.B. stand. Left is the latest "Arora" toaster griller hot cupboard. Below is the new "Kent" dishwasher for use in limited spaces, by Max Arc & Electrics

New also is Benham and Sons 'Heavy duty' electric range unit. The "Magimix" introduced recently by E. and J. Bowman now has a new cake mixing bowl attachment which, with the machine, costs £23 5s.

Now also available for the chef is a 12 qt 'Rowlway' food mixer by the Churn Co.

Coffee having assumed its rightful importance in the eyes of the food experts, several new brewers are now available. James Stott have an entirely new Continental Coffee Maker which makes 2 gallons at a time and is simple to operate. Cona have answered with the new "Conabar" coffee "console." British Vacuum Cleaners, makers of "Magneta" clocks, have as their latest addition, the M.16 recorder to keep a check on the clock.

overseas news

Syria Approves

The Syrian Parliament last week ratified a Bill providing for the nationalisation of tramways and electricity and water supplies. Syria is the first Arab country to take such a step. The electricity and tramway concerns in Syria are owned by a joint French and Belgian firm. Under the Bill, compensation will be paid to the owners, and the present employees will be retained.

A Bleak Outlook

Electricity restrictions in Victoria, Australia, this year, were expected to be the worst the State had ever had, the Minister for Electrical Undertakings, Mr. Dodgshun, declared a few days ago. He added that he had asked the State Electricity Commission for a report on the supply position for the coming winter. This report would be ready about the end of the month.

Plant for Adelaide

The Electricity Trust of South Australia has placed orders in England for two more 30 MW turbo-alternators for the new Osborne "B" power station, Mr. C. F. Drew, chairman of the Trust, announced a few days ago. This follows the recent visit to this country of Mr. R. H. M. Lea, chief engineer and general manager. Two turbo-alternators have already been installed at Osborne "B," Mr. Drew said, and two more would be delivered next year. Those just ordered, are expected to be in operation in 1956. Mr. Drew said the capacity of Osborne "B" was now 45,000 kW, with two turbo-alternators and three boilers in commission. By the coming winter another boiler will be in use stepping up capacity to 60,000 kW, and by the end of 1952 four turbo-alternators and eight boilers will be operating, giving a capacity of 120,000 kW. With the completion in 1956 of Osborne "B," with six turbo-alternators and 12 high-pressure steam boilers, the station's total capacity will be 180,000 kW, making with the 80,000 kW at the "A" station, a grand total of 260,000 kW for the Osborne power houses.

Those "Packaged" Units

Emphasising that the State Electricity Commission had been assured that the first shipments of the double-set "packaged" generating units for Sydney, N.S.W., ordered from the U.S.A., would commence in about two months' time, Mr. Cahill, Minister for Local Government, announced that the first unit would be installed at Port Kembla power station. The unit is one of three being purchased by the State Government in an effort to ease the electricity shortage. Purchase of a fourth unit is contemplated, and the four sets are expected to produce about 50,000 kW. Mr. Cahill said that the second unit will be placed at Penrith and the third at either Newcastle or Maitland. The units will be placed at points on the interconnected power system to serve the dual purpose of adding to the total power generation, as well as reducing the load on the transmission systems.

Incidentally, when Mr. H. Riggall, managing director of Ruston and Hornsby, Ltd., arrived in Sydney a few days ago, he said the N.S.W. Government was negotiating with his firm for the purchase of 1,000 kW diesel-engined power plant.

Oil for Troubled Waters

The Victoria State Government has approved the placing of a £6,600,000 order by the State Electricity Commission for the bulk purchase, handling and delivery of fuel oil for use over six years at Newport, Richmond and Spencer St. power stations. The contract will be placed with Commonwealth Oil Refineries Ltd., and will cover the supply of 800,000 tons of oil. The main oil consumer will be the Richmond power station, where the Commission is now installing a new generator with two special oil-fired boilers. The oil will be needed also for new diesel power stations being built at Shepparton and Warrnambool and for proposed stations at Swan Hill and Mildura.

Rural Electrification

Under the Province's Rural Electrification Scheme, 10,000 homes and buildings had been connected in 1950, Mr. W. D. Fallis, general manager of the Manitoba power Commission, disclosed recently. The programme included extension of transmission lines to 37 towns and villages and 33 farm areas. Service extensions were made in December to more than 600 farms. Power purchased by the Commission and generated during December was 26% more than for the same period in 1949, he said.

Power Potential

Development of potential hydro electric power sites on the St. John River in both New Brunswick and Maine will be explored at the first meeting of the International Joint Waterways Commission's recently appointed Engineering Board to be held this month.

S.A. Extension

A five-year plan to supply the whole of Umvoti County, Natal, with electric light and power, reached finality during the visit to Greytown last month of Mr. E. L. Damant, of the Electricity Supply Commission of South Africa, when an agreement was made with the town council. Under the plan the Cedara substation will be linked with Greytown within a year or 18 months and will take over the supply of light and power to the town, at

present served by its own small power plant which is incapable of meeting the town's existing needs. Estimated cost of the line from Cedara via Schroeders to Greytown was in the region of £74,000.

New Station

A start on the new power station which, with the extensions being made to the existing power stations, would secure for East London an adequate electric power supply for many years to come, was expected to be made in April, Mr. A. Foden, manager of the Border Undertaking of the Electricity Supply Commission of South Africa, has stated. It was hoped, he said, that the station would be ready for commissioning in 1954. Cost of the first section of the new power station is approximately £2,367,000. Built in 1905, with a generating capacity of only 150 kW, and intended chiefly for operating the harbour cranes, the present power station has been extended almost continuously until now its capacity is 24,500 kW. Extensions are now in hand for the installation of another 7,500 kW turbo-alternator. Next to the power station is the 5¼ acres site which has been hewn out of almost solid rock by convict labour over a number of years. The ultimate plan of the Commission is to install a plant to the capacity of 90,000 kW capacity. Orders have been placed overseas for the plant required in the first section of the new station.

Plans for Port Elizabeth

Port Elizabeth ratepayers last month approved the expenditure of £564,610 on electricity extensions. This is part of a plan to spend £1,512,700 on the undertaking before the end of 1955. The amounts estimated for annual distribution works rise from £91,200 in 1951 to £171,000 in 1955. Power station plant and accessories, from £130,000 in 1951, drops to £15,000 in 1955. The Zwartkops power station of the Electricity Supply Commission of South Africa should by then have been operating for two years. The Mount Road municipal station will be retained, but by then the limit of its expansion will probably have been reached. Inter-connecting cables between the Mount Road and Zwartkops stations are estimated to cost £90,000. Although provision is made in the five-year plan for transmission lines through Humansdorp to Hankey, the year when these can be laid will depend largely on the Council's decisions on the power for the augmented water supply from Churchill Dam. A first instalment of £10,000 has been set aside for expenditure on this work.

Increased Consumption

Last year Kimberley used more electricity than ever before. During the year 29,330,000 units were consumed. Of this 11,880,000 units were sold to domestic consumers—an increase of 2,050,000 units or nearly 21% over the previous year. The overall increase in the city's consumption was 14·7% over the 1949 figure. The most striking gain over the period was in the sale of power for industrial purposes.

Help for Control Engineers?

A device which has been developed by the Friez Instrument Division of the Bendix Aviation Co., with applications in the electricity industry, was exhibited at the American Meteorological Society's annual meeting last week. Called an illuminometer, it forecasts daylight intensity. Studies made at Baltimore showed that a cloudy day adds about 40,000 kW to a light load, while a very humid day adds about 80,000 kW and a cold clear day approximately 50,000 kW. The Bendix Company claims that its new instrument will enable power station engineers to estimate more accurately the additional amount of current needed, thus obviating last-minute changes in generating plants. The new unit costs 950 dollars.

Another 380 kV Line

The Swedish State Power Board has decided to construct a third 380 kV power line, according to a *Reuter* report. This will run from Skana to Hallsberg in Central Sweden, where it will be linked with the circuit from the new Harspranget power station in the north. The circuit will pass through Gothenburg, but it has not yet been decided whether it should be erected as far south as Malmo or stop in North-Western Skana, Sweden's southernmost province. It will have a length of 420 kilometres and will cost about 42,000,000 crowns. Designed primarily for Swedish internal needs, it may also be used, if need be, for the export of power from Norway to Denmark by way of Sweden, which is now being discussed by the three Governments. The 380 kV line between Harspranget and Hallsberg is to be opened in about a month's time, although sections of it have been in use for some time. The second circuit of this voltage is under construction and will run from Angermanalven, a river in the north of Sweden, to the town of Enkoping in the centre of the country.

Israeli Extension

The Beersheba Municipality has reached agreement with the Palestine Electric Corporation for this town to be linked up with the country-wide electric power system. The first instalment of 1£35,000 to be paid by the Council has already been handed over, and work on the high tension line is to begin soon. It is expected to be completed within three months. The new line is expected to lead to a rapid expansion of local industries here. Until now the town has been supplied by a small local generator.

Link-up

A second 0·25 e.h.t. cable was recently laid by the China Light and Power Co. across the harbour from their installation at Hok Un, Kowloon, to link up with the Hong Kong Electric Co.'s undertaking at North Point. The task was accomplished in 35 minutes, with the aid of lighter and tugs.

PERSONALITIES

IN THE INDUSTRY

The recent retirement of **Mr. I. Lockwood** from the position of district engineer, London Electricity Board, West Ham, was marked by a farewell dinner at which **Mr. J. W. J. Townley,** C.B.E., M.I.E.E., manager of the Board's North Eastern Sub-Area, presented him with a gold watch from colleagues and friends. The many speeches paid great tribute to Mr. Lockwood's outstanding qualities and recalled that he had spent 42 years in the supply industry and had occupied various mains appointments with the Huddersfield, Kent Power Co., West Ham and Sunderland undertakings. He returned to West Ham Corporation Electricity Department in 1928 and was appointed distribution superintendent in 1945.

Mr. I. Lockwood

We offer our congratulations to **Mr. B. Barber,** A.M.I.E.E., and his wife, on the recent celebration of their diamond wedding. Mr. Barber, who is 82 years of age, still runs an electrical and radio business at Oulton Broad. Born in Great Yarmouth, he was trained as a marine engineer, but later turned his attention to electrical engineering. In 1904, in conjunction with the late Mr. J. Croft, the Oulton Broad Electricity Co., Ltd., was formed, of which he was engineer and manager. Of those early days he has many interesting recollections. We wish the charming couple continued good health and happiness.

So far this year 113 employees of W. T. Henley's Telegraph Works Co., Ltd., have received gold wristlet watches presented by the company in recognition of their long service. To qualify for these awards, male employees must complete 40 years with the company, and female employees 30 years. The presentations have been made at the company's head offices and works by Sir Montague Hughman, chairman of the Henley organization. Several senior officials have been among the recipients of gold watches at the recent ceremonies, including **Mr. F. W. M. Anderson,** director and general manager; **Mr. A. H. M. Jacob,** director; **Mr. A. W. C. McArthur,** director and works manager, Henley rubber cable factories; **Mr. E. E. Judge,** works manager, Henley paper cable factory; and **Mr. G. E. Rhodes,** deputy general manager. Most of the recipients have been employees at the company's factories at North Woolwich and Gravesend, Kent.

From the beginning of next month, **Mr. R. F. Burston,** A.M.I.E.E., takes up his new duties at Newport, Mon., as commercial officer for the Eastern sub-area of the South Wales Electricity Board. He took over his present post as senior assistant sub-area commercial officer, Wear Sub-area, North Eastern Electricity Board, in 1948. Previously he served with Stockton-on-Tees Corporation as chief assistant electrical engineer for a short time. From 1940 to 1947 he was at Greenock, latterly as mains superintendent. He had gained earlier experience with the North Wales Power Co. as district mains engineer, and with the Wolverhampton Corporation undertaking in various capacities.

Mr. C. A. Mathes and **Mr. H. J. Latham,** directors of Bylock Electric Ltd., have recently left this country to visit the U.S.A. where they are to study marketing conditions between the two countries. They expect to be away for approximately a month.

Mr. N. I. B. Harrison, A.M.I.E.E., has now been appointed manager of the Lighting Department of Cryselco, Ltd. In addition, **Mr. J. V. Walshaw,** who recently passed his final City and Guilds in illuminating engineering, and who has been operating from Leeds, has now joined the illuminating engineering staff of Cryselco, Ltd., at Bedford.

On his retirement after 35 years' service in the electricity industry, **Mr. R. J. Sweeting,** assistant engineer, Cirencester, to the Southern Electricity Board, was recently presented with a wrist watch on behalf of the district staff.

Mr. E. E. Judge, left, being congratulated by Sir Montague Hughman. Mr. S. Wilson, deputy works manager, on the right

A former Lancashire Dynamo & Crypto apprentice, **Mr. C. G. Abbey,** now president of Bepco Canada Ltd. (an associated company of L.D.C.) has given a new shield to be presented yearly to the apprentice in his old company who gains the best Ordinary National Certificate pass. The first recipient of this "Abbey" shield was **Mr. C. Holmes** who received the award at the annual dinner of the College and Technical Apprentices Association at the Trafford Park works of L.D.C. recently. At this dinner, which was presided over by **Mr. A. W. A. Dick-Cleland** (Trafford Park Works) and **Mr. D. C. Lorkin** (Willesden Works)—joint managing directors—126 apprentices and parents accepted the company's invitation to attend. During the evening entertainment was provided by the apprentices and other prizes won during the year were presented, including the "D-C" cup to **Mr. A. Gorton** the best all round apprentice.

At the first meeting of the reconstructed Radio Industry Council, **Mr. J. W. Ridgeway,** O.B.E., was elected chairman and **Mr. G. Darnley Smith,** vice-chairman. The new Council consists of 16 members, four being nominated by each of the constituent associations (B.R.E.M.A., R.C.E.E.A., R.E.C.M.F. and B.R.V.M.A.) and nominations are for one year only. Among other innovations under the new constitution are an executive committee consisting of eight members, two being nominated by each constituent, and a committee of secretaries of the R.I.C. and constituent associations with the director, R.I.C., as chairman. The new executive committee consists of: **Mr. P. D. Canning** (Plessey Ltd.); **Mr. G. Darnley Smith** (Bush Radio Ltd.); **Mr. M. M. MacQueen** (General Electric Co., Ltd.); **Mr. G. A. Marriott** (General Electric Co., Ltd.); **Mr. F. S. Mockford** (Marconi's Wireless Telegraph Co., Ltd.); **Mr. L. H. J. Phillips** (Metropolitan Vickers Electrical Co., Ltd.); **Mr. W. F. Randall** (Telegraph Construction and Maintenance Co., Ltd.); and **Mr. J. W. Ridgeway** (Edison Swan Electric Co., Ltd.).

Winner of the Elizabeth Sloan Chesser Cup for 1950 is **Miss Joan Sharp,** as we announced last week. Unfortunately, her photograph arrived too late for inclusion then, and we now reproduce it alongside. Miss Sharp is senior demonstrator at Oldham to the North Western Electricity Board, and has had about twelve years experience of demonstrating. She was for a short time with the Ministry of Food.

Miss Joan Sharp

Tube Investments Ltd. announces that **Mr. E. D. E. Andrews, Mr. T. J. Boulstridge** and **Mr. P. Grove** have been elected to the Board. In addition, on the resignation of the secretary, **Mr. A. B. I. Dick,** to devote his wholetime energies as managing director of the subsidiary, Talbot Stead Tube Co., Ltd., **Mr. I. Turner** has been appointed secretary.

Mr. Charles Pitcher

Mr. S. E. Whorton

After a lifetime in the electric heating industry our old friend **Mr. Charles Pitcher,** London manager of Premier Electric Heaters, Ltd., has recently retired. He is succeeded by **Mr. S. E. Whorton,** who was formerly the firm's representative in the London area. Mr. Pitcher had served with the company for 39 years, but before he joined them in 1912 he had already been associated with another of the old companies—the British Prometheus Co., Ltd., at Kingston-on-Thames, since 1903—and in all those days of development he played his part well. We join his many friends in wishing him many more years of good health and happiness—we shall miss his occasional telephone calls.

Mr. A. L. Fielding, M.Inst.C.E., M.I.E.E., A.M.I.Mech.E., advisory and inspecting engineer for the New South Wales Government, has relinquished his appointment as official representative in London for the Snowy Mountains Hydro-Electric Authority of the Australian Commonwealth Government, owing to pressure of work for the State Government. He will continue to act as consultant to the Authority, whose business is now being conducted from 1 Regent Street, London S.W.1. Correspondence should henceforth be addressed to the "Engineer-in-Charge" at that address.

At present district commercial officer with the No. 2 (Bridlington) District of the No. 6 (Hull) Sub-Area, Yorkshire Board, **Mr. H. Roberts** has been appointed to a similar post in the Bracknell District of the No. 1 (Southall) Sub-Area of the Southern Electricity Board. Prior to vesting day, Mr. Roberts was chief commercial assistant with the Buckrose Light Power & Co. Ltd. at Driffield, Yorks, having had previous service with the Basingstoke, Skipton and Colwyn Bay undertakings.

Members of the North Western Electricity Board had a pleasant task on January 22, when, during a board meeting, they presented the chairman's cup, which goes to the winner of the

Mr. Cobham receives the cup from Sir Joseph

Board Annual Service Centre Window Display Competition, to 36-year-old **Mr. J. Cobham,** whose display at Hyde (Cheshire) was adjudged the winner, as we have already announced. It was a special occasion, too, for Mr. Cobham, for this success followed other triumphs in window display competitions. He designed the winning entry in the section devoted to electricity boards of the Hoover Company's 1950 Competition, after taking a second prize award in the same competition the previous year. Mr. Cobham, who was assistant-in-charge of the Hyde Service Centre at the time the Board's competition was concluded, is now a member of the commercial staff of the Board's No. 3 Sub-Area Headquarters. The presentation of the cup—which is held for one year—and a replica to be kept by the service centre, was made by **Sir Joseph Hallsworth,** chairman of the Board. Presentations have also been held through the Sub-Areas of replicas which go to winning entrants in the various preliminary Sub-Area Competitions.

OBITUARY

The electrical industry has lost another of its veterans by the death on February 1 of **Sir Arthur Preece,** LL.D., M.INST.C.E. M.I.E.E., aged 83, a partner in the well-known firm of consulting engineers, Preece, Cardew and Rider. Sir Arthur received his early education at King's College School, and, after a period in Germany, attended King's College, London. He became a pupil at the Wolverhampton works of Elwell Parker, Ltd. (later the Electric Construction Co.), and in 1889 acted as assistant engineer at erection and operation of the power station in Rathbone Place for the Metropolitan Electric Supply Co. In 1891 he joined the late Dr. Gisbert Kapp's staff, being employed in the preparation of plans for the Bristol power station. Two years later he started business in Victoria Street as a consulting engineer, and carried out many large electric light and power schemes. In March, 1899, he combined with Sir W. H. Preece, Major Philip Cardew and his brother Llewellyn Preece, continuing as consulting engineers. Sir Arthur was busily engaged on electricity supply schemes in various parts of this country and abroad, visiting many of the Crown Colonies, the Far East and South America. He was early convinced of the benefits to be obtained from adequate and efficient supplies of electricity in the Colonies, and he devoted considerable attention to that work. His services to the State were recognised in 1932 by the award of a knighthood. For some years Sir Arthur had suffered from failing eyesight, and on his doctor's advice he retired from active work in March, 1949.

Sir Arthur Preece

The death occured on January 26 of **Mr. J. E. Grant,** aged 72, who retired about twenty years ago from the position of manager of the electrical carbon factory of the Morgan Crucible Co. Ltd.

His many friends in the industry will regret to learn of the death on January 16 of **Mr. C. B. Nadaud,** who retired in June 1948 from the position of area sales engineer in the northern area of the Northmet undertaking. After early training, he joined the Northmet Co. in 1925, but two years later took up a position with the Kent Electric Power Co. Subsequently he joined the Worcester electrical contracting concern of Abell and Smith as a partner, but returned to the Northmet in 1932. A keen singer and rotarian, he will be greatly missed.

The death occurred on January 26 of **Mr. L. Sewell,** aged 59, who had been power station superintendent at Greenhill generating station, Oldham, North Western Division of the B.E.A., since last July, having earlier been deputy station superintendent there from 1948. He went to the Greenhill station in 1920 as charge engineer, following experience at Dumfries, Barrow-in-Furness, and Morecambe.

The death occurred on February 3 at Chelmsford, of **Mr. A. W. Lay,** M.INST.E., A.M.I.E.E., F.INST.P.

We learn of the death on February 1, of **Mr. Samuel Hepworth,** aged 55, director and founder member of Hepworth England Ltd., electrical engineers and contractors, of Batley.

We note the death on February 2, of **Mr. H. H. Parker,** A.M.I.E.E., aged 65, who was for 25 years, borough electrical engineer at Pudsey, and had been district manager to the Yorkshire Electricity Board since nationalisation up to his retirement last October.

WILLS.—Mr. H. Tinsley, founder of H. Tinsley and Co., left £24,319 (£24,136 net value).

Mr. T. P. Wilmshurst, M.B.E., M.INST.C.E., M.I.E.E., Electricity Commissioner, 1926-35, formerly chief engineer, Exeter Electric Light Co., and borough electrical engineer, Halifax, and later at Derby, left £22,387 (£22,305 net value).

Standardisation and Production

Application of Standards and Simplification in the Electrical Industry

TWO papers delivered to the I.E.E. last Thursday dealt with the application of standardisation to the electrical industry. The first of these by J. T. MOORE had originally been presented to the North Staffordshire Sub-centre as the chairman's address.

Entitled "Standardisation and Simplification in the Electrical Industry," it dealt with the subject broadly, describing the general growth of the B.S.I., and the manner in which that organisation operated. It was pointed out that the subject of dimensional standards was undoubtedly the most controversial feature, as due to design improvements or differences, an article by one manufacturer might be much smaller than that produced by another, and the introduction of a dimensional standard would then make the former depreciate his design to conform with the standard.

In general, it was suggested, other forms of standardisation and simplification could be introduced which would enable development and design improvements to take place unhindered. As examples of this type of standardisation, the author quoted the preferred ratings of turbo-alternators, transformers and to a certain extent motors.

On items of general use in the building of final products, such as ball and roller bearings, the author considered that the tolerances laid down were often too wide and that there should be an international standard similar to those now being laid down for screw threads. The paper concluded by giving appendices quoting extracts from the Anglo-American Council on Productivity Report, on "Simplification in Industry" and from the "Lemon" Committee's report on the "Standardisation of Engineering Products."

Practical Organisation

The second paper, by MR. P. J. DAGLISH, dealt with "An Organisation for Internal Standardisation in a Large Manufacturing Company." The savings to be made in reduction of drawing office time, quicker inspection, etc., were emphasised. It was put forward that the standards engineering department should be a separate department which would produce and distribute standards in consultation with the technical departments concerned. The manager of the standards department should be given full authority on all matters affecting internal standardisation policy, and his standing should be such to enable him to discuss questions of policy with chief executives and works managers on terms of equality. The paper went on to discuss the general "set-up" for a typical type of organisation. The main portion of the staff should be located in a central office serving all the works in the organisation. This office should be divided into three main sections dealing respectively with the standardisation of components, material standards, and specifications, each in charge of a senior standards engineer. In addition, there should be a clerical section of sufficient size to provide adequate distribution maintenance and typing facilities. The author was of the opinion that the standards office would be particularly useful for apprenticeship training.

Co-ordination

A high degree of co-ordination between the various departments was essential. The design department should, in the interest of cheaper production, use B.S. or company specifications wherever possible, and avoid the use of special materials. As the drawing-office translated design data into working drawings, it was responsible for ensuring that all relevant specifications and standards were used in the shops, and its full co-operation was therefore essential. Production departments would have to ensure that all operators were familiar with relevant process specifications and other manufacturing standards, and inspection departments that all materials used complied with the appropriate purchase specifications. Both the purchasing and consultant departments were also involved though in a somewhat lesser degree.

The author continued by outlining a few general rules applicable to the preparation of all types of standard, and described the principle types of standard and specification as used in a big organisation. Finally, he gave some general comments on the relation between standardisation and simplification, and ended with a strong plea for more co-operation between manufacturers.

D

DISCUSSION

MR. H. A. R. BINNEY (Director, B.S.I.) said he was convinced of the value of standards—a word he greatly preferred to "standardisation." A report by the committee set up by the Government in 1949 to consider standardisation with particular reference to the procedures, constitution and finances of the B.S.I. was about to appear, and he did not think he would be giving away confidences if he said that he thought it would recommend that the present constitution was the most suitable.

MR. D. E. LAMBERT (Reyrolle) said that the present shortage of labour and materials made standardisation essential, particularly if economic products were to be produced for competitive markets at home and abroad. He doubted if the present manpower situation would allow the establishment of a standardising organisation as described.

MR. T. M. H. STUBBS (B.E.A.M.A.) paid tribute to the work of the B.S.I. in holding a balance between manufacturers and users. He pointed out that standardisation did not always mean simplification and this was a point which should be borne in mind in trying to obtain the agreement of manufacturers who, though they might be willing to adopt standards, had sometimes spent a great deal of money in the interests of simplification and in this way been able to reduce the number of jigs and tooling operations.

MR. H. ASTBURY (Crompton Parkinson) said the difficulty with standardisation was to know where to stop. Switches and plugs which were used universally should obviously be standardised, but in many engineering products the need for close dimensional standardisation was not so great. He regretted the omission from the papers of any reference to the Electrical Research Association which was doing valuable work in providing standards for materials.

MR. L. DUNBAR (Standard Telephones) put in a plea for the standardisation of gauge sizes.

MR. A. N. D. KERR (Consultant) said that at a discussion on the same subject in Birmingham dimensional standards independent of ratings had been advocated. He was in favour of this proposal, though the dimensional standard should not be independent of the altered performance that was possible. Referring to N.E.M.A. standards, he said it was a tribute to British manufacturers that they had been able to get more out of the American standards than the Americans themselves. At the same time, we might learn from the American method of arriving at their standards. These were initiated by the manufacturers themselves and not the standards organisation and so commanded more support than if they had been sponsored by an outside organisation. He felt that industry did not make enough use of the small firms for sub-contracts.

MR. R. C. WINTON (Marconi) said that a great deal could be learnt from one's failures: there had been great difficulty in the radio industry in standardising the radio valve. It was desirable, of course, to standardise on the best type, but manufacturers did not like giving away their trade secrets to their competitors. Again, standards should be dynamic and a manufacturer who made improvements had the "know how" which took a long time to be communicated to his competitors. The solution would be to encourage manufacturers to exchange information at an early stage, but here again they did not always want to tell their competitors what their research and development departments were doing.

MR. R. B. ARMSTRONG (Marconi) thought more should be done to help industry to increase its productivity by standardising the standards, so that ordering would be simplified. He had just received a list of two hundred items of radio equipment giving the identification of the items in the firm's catalogue number and the drawing office references of six Government departments and four big industrial users. This had entailed putting ten draughtsmen on the job of working out the same components.

SIR ARCHIBALD GILL, President (who was in the Chair), said that when the Post Office wanted a new piece of equipment it asked the manufacturers to decide which of them should develop it. It then arranged that all the manufacturers in the group should supply it. This amounted to a form of standardisation.

BOOKS RECEIVED

Electricity, by L. E. C. Hughes. Review for the layman. Published by W. and G. Foyle Ltd., 123 pages, 7¼ in. by 5 in. Price 2s. 6d.

Domestic Water Heating, by R. Grierson. Practical textbook on subject. Published by Illiffe and Sons, 263 pages, 8½ in. by 5½ in. Price 25s.

Principles of Electrical Engineering, by G. C. Blalock. Degree standard textbook for engineering students not specialising in electricity. Published by McGraw-Hill, 605 pages. Third edition, price 47s.

Engineering Metrology, by K. J. Hume. Textbook for subject in I.MECH.E. and I.PROD.E. examinations. Published by Macdonald and Co. (Publishers) Ltd., 293 pages, 8½ in. by 5½ in. Price 18s.

Electrical Engineers' Reference Book, ed. E. Molloy. Comprehensive reference volume. Published by Newnes. Fifth edition, price 50s.

Electric Clocks, by S. J. Wise. Principles, construction, operation, installation and repair. Published by Newnes, 168 pages, 8½ in. by 5½ in. Second edition, price 12s. 6d.

Thermostats, by R. Griffiths. Description of various types and of their applications. Published by Charles Griffiths and Co. Ltd., 217 pages, 9 in. by 5¾ in. Third edition, price 20s.

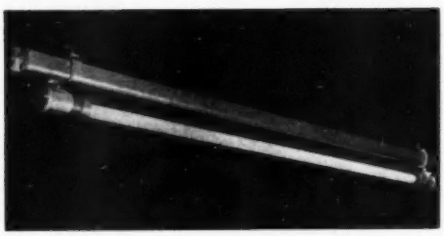
Diesel Fault Tracing, Maintenance and Repair, by S. Abbey. Practical manual for all types of high-speed diesel. Published by Pitman, 241 pages, 7½ in. by 4¾ in. Price 15s.

The BUYER'S *Column*

Mazda Dustproof Fluorescent Fitting

THIS new fitting produced by the BRITISH THOMSON-HOUSTON CO., LTD., Rugby, Staffs., is intended for such locations as mines roadways, where flameproof equipment is not necessarily required but where there is a need for a lighting fitting of robust construction that will protect the fluorescent lamp and its auxiliary gear from the surrounding atmosphere.

The Mazda fitting (Cat. No. F1131) comprises



a cast aluminium alloy channel housing the gear tray, and a clear "Perspex" protecting cylinder enclosing the fluorescent lamp. The standard fitting is designed for use with a single 80 W 5 ft. fluorescent lamp but similar units can be made to special order for use with 40 W 4 ft, 40 W 2 ft, or 20 W 2 ft lamps.

When the fitting is to be installed in mines roadways a cable gland is provided for use with steel-wire armoured cable. For other industrial applications the end cap is supplied with conduit entry. Suspension is by means of two adjustable straps round the back channel.

Venetian Lights

SOME distinctive good quality Venetian lanterns are being produced by BRIAN WYNATES SMITH, 99-101 New Sumner St., Birmingham 19.

There are many designs of lanterns, some styled on the ship's lanterns of our famous British "sea-dogs" after whom they are named. The "Drake" lantern, for example, is available in brass or copper with amber glass in common with the other Venetian lantern styles.

All lanterns are supplied with ceiling plates, hangers and lampholders. In some cases a 9½ in. wrought-copper or brass bracket is available.

Automatic Air Drying

CONTROL instruments operated by compressed air usually contain many fine air passages, and great care is necessary to prevent these being blocked by foreign matter. Rust and scale present obvious dangers in this respect, and the best precaution against these is the thorough drying of the air. An equipment specially designed for this purpose, and offering all the advantages of continuous working and automatic operation is the "Lectrodryer," manufactured by BIRLEC LTD., Erdington, Birmingham 24.

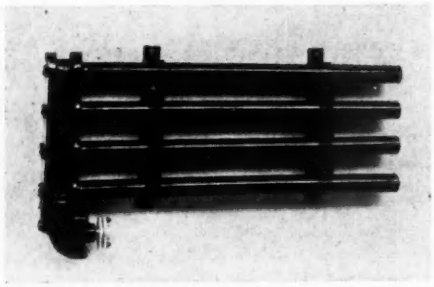
The plant illustrated is installed in a Courtaulds, Ltd., factory at Carrickfergus, N. I., and handles 60 cu ft of free air/minute when compressed to 50 lb/sq in. Each cylinder is filled with activated alumina, and one is in circuit at a given time. After eight hours of operation, during which the delivered air is dried to a degree at which no water will condense out at 15° F, the other cylinder, which is already at full pressure, is switched in by the rotation of a motor-driven 4-way valve.

The released cylinder is now heated by an electric heater, switched in by limit switches on the shaft of the time-switch-controlled f.h.p motor that actuates the main valve. While it is being dried, a solenoid-operated valve opens to atmosphere, and a small amount of air is allowed to escape from the air main to the outside via the cylinder. When the alumina is dry, as indicated by the action of an embedded thermostat, the escape valve is closed, so that pressure builds up again, and the cylinder is allowed to cool down, ready to take over the drying duty at the end of another eight-hour cycle. "Lectrodryers," in similar self-contained units, are available in a wide range of sizes for many duties.

Arora Flameproof Heaters

ANOTHER important but less familiar branch of the activities of the ARORA CO., Roseberry Street, Loughborough, Leicestershire, is the manufacture of special flameproof tubular heaters.

We illustrate a four-tier 3 ft tubular heater which was supplied recently to meet the requirements of Lloyd's register of shipping for vessels carrying bulk petroleum. These were designed to conform with the standards laid down in Section 15 of these rules for electrical equipment and also with B.S.229 for flameproof equipment.



For this particular order, two-tier, four-tier and six-tier heaters were supplied for use in the crews' mess decks and other accommodation.

Truvox Firebars

BY arrangement with Truvox Ltd., METWAY ELECTRICAL INDUSTRIES Ltd., King Street, Brighton, Sussex, are now able to supply spare firebars for their fires. The list price of the firebar (Metway B.E.372) for the Truvox DF11AB fire is 9s. 2d. each plus 15%. The price of Metway's TR572 bar for the Truvox DF11A is 10s. each, plus 15%.

A.G.S. Control Cuts Prices

LATEST development by the ELECTRICAL REMOTE CONTROL CO. LTD., 13-15 Evanston Avenue, Highams Park, London E.4, is the Type A.G.S. control unit.

This unit is developed particularly for use in the building of automatic i.c. engine generating sets. The incorporation of an anisotropic iron strip core in the choke of the A.G.S. control unit gives a highly efficient choke at a low cost and thus makes possible the use of an inexpensive standard relay.

These improvements have enabled the company to quote for the more simple A.G.S. control units at prices almost half those normally obtaining.

Material Testing

MECHANICAL tests performed on raw materials can give a great deal of useful information as to their suitability for subsequent processing. The range of tests available has grown considerably over the last twenty years, and some guide to the mass of literature on them is needed by all engineering students. A well-illustrated booklet entitled "Mechanical Tests and Their Bearing on Working Properties" has been prepared for this purpose by the NORTHERN ALUMINIUM CO. LTD., Banbury, Oxfordshire. While the simple descriptions of standard test methods will be welcomed by all students, perhaps its most valuable feature is a series of notes on the relationship between the test results and the behaviour of the metal in operations to which it is subjected.

A 3-Colour Hand Lantern

A DUAL purpose hand lantern with push-pull control, giving three different colour beams —red, white or green is now available from C. W. DENNY, 8 Beaumont Court, Sutton Lane, Chiswick, London W. 4.

The colours are produced by a two-coloured "Perspex" tube which slides forward over the standard white lamp.

The lantern is of the stormlight pattern, having a top light giving all-round illumination, whilst the centre reflector gives a powerful colour beam. The lantern has innumerable uses in railway, harbour, police and other work.

TRADE PUBLICATIONS

RECTIFIER EQUIPMENT.—Mr. V. W. Press's article on Variable Speed Drives by grid controlled rectifiers which appeared in the ELECTRICAL TIMES November 23, 1950 issue, has been reprinted in booklet form by Lancashire Dynamo and Crypto of Trafford Park, Manchester, and Willesden, London.

CONTRACTING WORK.—An admirable survey of the history and present-day activities of a well-known firm of electrical contractors and engineers has been issued by B. French, Ltd., Pike Mills, Green Street, Kidderminster, under the title "Electrification."

SWITCH AND FUSEGEAR.—A complete list of "Coolex" switchgear and fuseboards has now been issued by Falk Stadelmann and Co., Ltd., 91 Farringdon Road, London E.C.1.

IMMERSION HEATERS—List P2315 issued by Falk Stadelmann and Co., Ltd., 91 Farringdon Road, London E.C.1, gives details of the range of first-rate immersion heaters and circulators available from the company.

ELECTRICAL ENGINEERING.—New "Metrovick" publications issued by the Metropolitan Vickers Electrical Co., Ltd., Trafford Park, Manchester 17, include the following :—Torque characteristics of f.h.p. motors, voltage regulating relays and line drop compensator, the electron diffraction camera, single phase (permanent split phase capacitor) light power motors. Single-phase repulsion—induction motors, an industrial electric timer, auto transformer contactor starters, a.c. contactor for capstans and winches, electronic control equipments for a.c. systems. Rotary synchroscopes, a motor generator set for trolley-buses, vehicle heater vents. "Thermac" single-operator transformer arc welding equipment.

"Miniseel" Stage Lighting Control

AN interesting development in the field of legitimate stage lighting control is the recent introduction by Stage Electrical Equipment, Ltd., a London firm, of the "Miniseel" d.c. saturable choke stage dimmer board.

Whilst lighting control by saturated choke cannot be considered an entirely new development in this field the "Miniseel" system is regarded as a new scientific approach to the problem.

Choke dimming incorporates five important factors—electrical mastering, which by a system of two-way switching any one or more circuits can be coupled into bank master or grand master dimmers, thus allowing individual banks to be brightened or dimmed simultaneously; elimination of moving parts; ease of operation; long life; and, in the case of the "Miniseel" system, small size.

An example of the compactness of the "Miniseel" system is to be seen at the Islington Town Hall where we were privileged to witness a demonstration of the system. Here the wing space is very limited, yet a 36-way "Miniseel" board has been installed which occupies only 5 ft 6 in. x 2 ft 6 in. x 1 ft 6 in. deep, with full bank and master control.

The physical relationship in cubic feet of space of the "Miniseel" board with a standard radial-type control is in the order of 1 : 43, a factor which has obvious advantages. An added advantage of this system is that the choke bank may be installed in any remote position, in outside gangways, etc.

Proportionate dimming of all circuits is effected by the fact that with electrical mastering the applied voltage is controlled by the bank master. Individual circuits can be set at various points and brought up to their desired brilliance in operation by one of the master controls. The small size of the control panel makes it possible for the entire panel to be duplicated and brought into action with a quick or slow changeover.

Fluorescent lighting can be used in conjunction with the filament type, being controlled from the same panel using a similar principle of operation.

"Miniseel" boards are supplied built on the unit principle, either 9 or 12 ways wide, so that almost any number or combination of panels can be obtained. The price, which includes the control board and chokes but not wiring, works out at an approximate figure of £20 to £22 per way.

I.E.E. South Midland Centre

MUTUAL indebtedness of the Institution and the City of Birmingham was the theme developed by Mr. D. H. KENDON, B.SC. (ENG.), M.I.E.E. (chairman, I.E.E. South Midland Centre), in proposing the toast, "The City of Birmingham," at the jubilee dinner held on Friday last.

Welcoming ALDERMAN HUBERT HUMPHRIES, J.P., the Deputy Mayor, he said that he regarded his presence as a personal gesture of friendship, as well as a recognition of the important part played by the I.E.E., and industry, in the prosperity of the city. This occasion, he said, was more than an annual dinner, it was a jubilee, and the Centre had existed for nearly three-quarters of the life of the Institution, and had contributed its quota of papers—and presidents. Mentioning the part played by Birmingham in the supply industry, he pointed out that it had acquired a 5-MW company in 1900 and handed over 500 MW in 1947. By its encouragement of the supply industry, its encouragement of manufacturing and small manufacturers, and its educational policy, it had earned its title of the workshop of the world. While it owed much of its development to the work of the I.E.E., the debt was mutual.

The toast of "The Institution of Electrical Engineers" was proposed by the RT. HON. OLIVER LYTTELTON, D.S.O., M.C., M.P. (chairman, A.E.I., Ltd.). Electrical science, and engineering, led by the I.E.E., had, he pointed out, made a greater contribution to man's control over matter than any others, and he could see nothing but wider horizons and greater accomplishments than those which had attended them during the last half-century. The highest tasks to which human spirit could turn were not, however, the conquest over matter, but the conquest of man over himself, and he begged all, whatever their political complexion, to use some of the genius they applied to material things for the solution of the spiritual problems which pressed on us every day of our lives.

Replying, SIR ARCHIBALD GILL (President, IEE), referred to chairmen of the Centre who had become presidents of the I.E.E. On the work carried out by the I.E.E., he instanced a total of 1,162 meetings in the year over the country as a whole. Congratulating the Centre on the part it played, he had no doubt that it would be as valuable in the future as it had been in the past.

"Guests and Kindred Societies" was proposed by Mr. W. H. BRENT, B.SC. (Hons.), M.I.E.E. (senior vice-chairman, South Midland Centre). Replying, SIR JOHN HACKING said that it was too much to hope that all present could attend the centenary dinner, but he hoped they might be there for the diamond jubilee.

Turning to the topic of plant shortage, Sir John pointed out that 1938 saw 750 MW added, while 1950 saw 965 MW (S.O.)—a 40% increase. He would be very disappointed if 1,250 MW was not achieved in 1951.

Commenting on the coal price increases announced earlier that day, Sir John hoped that it was not proposed to make a flat rate increase of 4s. 2d. a ton, as had been the case so often, which led to the users of low-grade fuel subsidising those who used good coal. At the figure given the cost to the B.E.A. would be between £6 million and £7 million a year, which would have to be met by a rise in tariffs.

Codes of Practice Speed-up

TOWARDS the end of 1949 the Council for Codes of Practice for Buildings, formed from the professional institutions, which operated with the active interest of the Ministry of Works, decided to modify its programme for the production of codes so that the work could be brought to conclusion within two to two and a half years. The story of this and other reorganisation of the work of the Council is told in the Fourth Report (Jan. 1947-Dec. 31, 1949) issued last week by H.M. Stationery Office (price 1s.).

Codes for public works and for civil engineering were removed from the programme, at the request of the four engineering institutions primarily concerned. An executive committee was appointed, with instructions to meet regularly and wide powers of decision in regard to the conduct of the work. The overriding "Code of Functional Requirements of Buildings" was made the responsibility of this executive committee.

With regard to the drafting of codes, and their publication, one stage of committee procedure was abandoned to cut down the work involved. It was decided that the issue of related codes and sub-codes in one volume should be more widely adopted, and that the tendency to include excessive explanatory or descriptive matter in the general series of codes should be avoided.

The revised programme envisages the production of ten chapters of the Code of Functional Requirements of Buildings, and 224 general series codes.

The report concludes that by the end of 1949 "it had become evident that the national demand for codes was established, and that their usefulness as guides to practitioners and to the interpretation of technical points in regulations and elsewhere as well as in teaching schools and institutes was becoming increasingly appreciated both at home and overseas."

An appendix to the report notes 26 codes and sub-codes under the heading "Electricity." Of these, all those dealing with electrical installations have been issued in final form.

Packaging Techniques Reach a Peak

SITUATED in the centre row of the first floor of Olympia's National Hall is an exhibit sponsored by the Anglo-American Council on Productivity and the Dollar Exports Board. It illustrates 62 examples of contemporary American packaging techniques. All items have been chosen by Raymond Loewy Associates, New York, because they illustrate an approach to the surmounting of particular merchandising problems, one example being the packs specially designed for goods being sold in America's "super-markets."

This stand is particularly interesting because it serves as a basis with which we can compare progress in British packaging development.

In our humble opinion, British packaging researchers in collaboration with the Institute of Packaging, have, during the four years in which we have concentrated on this problem, achieved a standard if not above, at least equal to that of our American contemporaries.

Mr. Harold Wilson, President of the Board of Trade, speaking at the inaugural luncheon of the Packaging Exhibition last week, drew attention to the ever d minishing supplies of materials and mentioned the possibility of reintroducing paper controls. Mr. Wilson said: "We are watching the situation closely to see whether any further steps may be needed . . . If the Institute of Packaging put forward a recommendation for the re-imposition of controls it is a recommendation . . . to which my department would give the most serious consideration."

New introductions this year include a new type of spiral winding machine for dealing with tubes from $\frac{3}{8}$ in. to $1\frac{1}{2}$ in. diameter by Perkin and Co., Ltd. The motors, winding head and cut-off are in one compact unit, and glue baths are thermostatically controlled.

Shown by I.C.I. are some of the more important industrial uses now being found for polythene film and they are giving demonstrations of modern heat sealing techniques.

Electro-Hydraulics Ltd. are proud of their Conveyancer E2-20/3W, an entirely new 3-wheel battery electric truck with a lift capacity of 2,000 lb lifting to 9 ft. Ayers and Grimshaw Ltd., Barnstaple, Devon, have a rotary parcelling machine incorporating thermo-controlled heater for wrapping packeted goods in cellulose film by heat sealing.

I.T.D.s latest addition to their "Stacatruc" range is a battery operated fork-lift truck with one ton lift at a load centre of 24 ins. (ht 9 ft).

Many anti-pilferage steel strapping machines are on show. New model on show is the automatic band strapping tool which tensions and seals in one movement. It is shown by the Package Sealing Co., Ltd.

THE WEEK

COMMERCE *in news* INDUSTRY

Fixed Prices for Scrap Metals

AN Order fixing the maximum prices of non-ferrous scrap metals has been made by the Ministry of Supply to discourage hoarding and stabilise prices so that they are in reasonable relation to those of virgin metals. In recent weeks prices of scrap have reached inflated levels and in many cases far exceeded virgin prices. At the same time, the Ministry states, supplies have been falling because of an expected rise in prices which resulted in firms holding back supplies—an action which could have disastrous effects on production. The Order—Non-Ferrous Metals Prices Order (S.I. 1951, No. 155)—exempts scrap which is situate outside the U.K. It is expected that another Order will be made shortly to provide for licensing the acquisition of non-ferrous scrap and secondary metal, and for rendering periodical stock returns. The M.o.S. advises that the best way of avoiding a detailed distribution scheme is to ensure the immediate return of scrap for re-use.

The maximum prices now permitted for various grades of copper, lead, zinc and brass are :

	£ per ton		£ per ton
Copper		**Zinc**	
Bright wire ...	180	Alloy die castings	145 / 120
Firebox	180	Cuttings	125
No. 1 wire ...	175	**Brass**	
Clean, heavy ...	170	Shell cases ...	175
No. 2 wire ...	165	S.A.A. cases ...	165
Braziery	148	Cuttings	165
Lead		Rod and fuze ...	155
Cable sheathing ...	124	Swarf	145
Other	117	Heavy	140

Edmundsons' New Acquisition

IT was announced last week that Edmundsons Electric Co., Ltd. have purchased the share capital of Alliance Wholesale Ltd., an old-established London firm with branches at Croydon, Luton and Maidstone. The present firm was formed shortly after the nationalisation of the electricity supply industry in 1948. In the same year it acquired from the B.E.A. the firm of Simpson Baker and Co., Ltd., electrical and general wholesalers, which had seven branches scattered over southern England and the Midlands. These two wholesaling companies will continue to trade as separate entities.

Mr. H. J. Grant became chairman of Alliance Wholesale Ltd. with Mr. F. D. Pratt as sole managing director as from January 1 and were joined on the Board by Messrs. A. H. Young and J. MacNish, both directors of Edmundsons. Messrs. A. G. Lindars and J. T. May continue as directors of Alliance, and the secretary of Edmundsons, Mr. I. O. Hamilton, is also secretary of the newly acquired company. Mr. Pratt will join the Boards of Edmundsons and Simpson Baker.

Admission of the Press

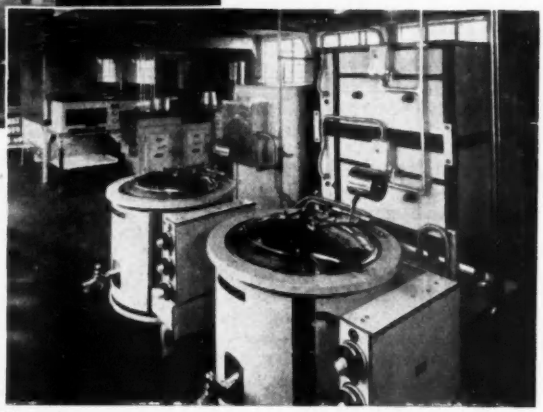
A PRIVATE member's Bill, which provides for the admission of the Press to meetings of various public bodies, has been introduced to the House of Commons by Mr. Martin Lindsay, Conservative member for Solihull. The text of the Bill, issued last week, contains a list of public bodies, and proposes that representatives of the Press should be permitted to attend the meetings of all of them unless special business makes their presence undesirable in the public interest. The list includes consultative councils established under the Electricity Act. The Bill, "Public Bodies (Admission of the Press) Bill" is third in the list of those presented by private members, and will come up for its second reading in the House on February 23.

New Companies During 1950

A SUMMARY of new company registrations during 1950 has been published this week by Jordan and Sons Ltd. Unfortunately newcomers to the electrical industry have been included under more general headings and it is therefore possible to gain only a limited amount of information from the figures. Mullard (Overseas) Ltd., Brush Export Ltd. and Thermo-Electronics and Engineers Ltd. are among the 198 large companies with an initial capital of £50,000 and over. Other new companies in the trade have been incorporated under two headings, "Electricity, Gas and Water," which includes firms concerned with radio, and "Engineers." In the former category there was one public company—capital not stated—and 439 private companies with a

The First Half-Century

An impression exists generally in this country that Russia is much behind the times in technical matters. Setting this, however, against a stereotyped phrase that "electricity is still in its infancy," it is easy to deduce that there is an error somewhere. Too little is known of what has been done, is being done and can be done in Russia.—*From our issue of February* 7, 1901.



Left is the new installation in the canteen at S. H. Rawnsley Ltd., showing the diffused lighting on top of the beams and, below, is the all-electric equipment in the canteen at the B.E.A.'s new Chadderton power station.

total nominal capital of £2,242,300. Under the second heading there were 1,275 new companies altogether with a capital of £7,724,957.

The Batti-Wallahs

MR. JOHN WATSON, chairman of the South-East London Juvenile Court, was the guest of honour at the monthly luncheon given by the Batti-Wallahs' held on Wednesday of last week, and the subject of his address was "Children in Trouble." Commencing with a few terse comments on the state of the law in the last century when it was possible to hang a child for petty pilfering and boys of eleven—as late as 1899—wore convict garb and went to hard labour for stone throwing, Mr. Watson explained in some detail, the objects and procedure of today's methods of dealing with juvenile offenders. Many of those who believe that the apparent laxity of the present regime is responsible for the present high figures for juvenile delinquency would have found their beliefs shaken by the address, which achieved the unusual combination of a passionate idealism allied with rock-bottom common sense.

Among the other guests who had the privilege of listening to Mr. Watson's discourse were the President's wife, Mrs. Nimmo, who is herself a magistrate, and Vice-Admiral A. C. G. Madden, the Second Sea Lord. The next luncheon will be on February 28, when it is anticipated that Lord Mountbatten will be the principal guest.

A Ferranti Venture

HAVING resigned from the board of Ferranti Ltd. (as we briefly recorded last week), Mr. Denis Z. de Ferranti is forming his own company which will manufacture power transformers, we understand. Announcing his decision, he said he had taken this action because he wanted greater scope for his abilities. Rhos Mill, Heyside, Royton, near Oldham, has been acquired, as a factory, it is reported. We hope to give fuller details next week. There is no suggestion of a family split, it must be made clear. Mr. Denis de Ferranti, who is 42, was director and general manager of Ferranti Ltd., of which Sir Vincent, his 58-year-old brother, is chairman and managing director.

Focus on Canteens

FOLLOWING reports on lighting, ranging from a transatlantic liner cocktail bar to a Sussex convent, included in these columns during the past fortnight, we turn now to installations in canteens, one dealing with lighting and another with electric equipment. British Thomson-Houston's Mazda lamps have been used at the factory of S. H. Rawnsley, Bradford, where an unusual arrangement has been adopted. Five feet, 80 W fluorescent lamps have been placed at a height of 12 ft and on top of beams spanning the canteen. In this way light is diffused upwards on to the ceiling. The warm coloured mellow light, coupled with the diffusing effect of "Perspex" coverings have provided a pleasantly soft and entirely adequate illumination.

From lighting we turn to appliances. One of the first buildings to be constructed on the new B.E.A. power station site at Chadderton was the canteen, where all-electric equipment supplied by James Stott and Co., of Oldham was installed. Although only a temporary structure for site workers, the new permanent kitchen will incorporate all the present appliances.

E.A.W. Examinations

THE results of the first E.A.W. examination for electrical sales assistants, held on November 30, have now been announced and show that 42

candidates were successful, including five men. The examination was open to all over 17 who had had at least one year's experience in a showroom or other commercial organisation. It was instituted to cater for those who were ineligible to enter for the two certificate examinations for demonstrators and saleswomen and for teachers.

Another result announced this week was the winner of the annual Home Workers' Certificate Examination. The Clr. Miss Walter Rose Bowl was awarded to the Whalley Range High School for Girls, Manchester, for the second successive year.

Stage Amplification at The Regent

THE audience at the first stage show performed at The Regent Theatre, Kings Cross, will, it seems, be an exceptionally fortunate one. Every advantage is being taken of the opportunity afforded by the conversion from a cinema to achieve the best results and turn the Regent into a model theatre, at least as far as presentation is concerned. On November 30 we referred to the new lighting installation, and the latest news of progress comes from Philips Electrical Ltd. who recently completed a stereophonic stage amplification system.

Greater sensitivity has been obtained from footlight microphones by two completely separate channels, one on each side of the stage. The whole of the stage has been brought into the effective orbit of amplification, making the use of floor-stand microphones almost superfluous, except for special effects. A method of balancing of the two channels has brought about an illusion of direction and from the audience's point of view the sound appears to come from its original source, an ideal often difficult to achieve.

Sub-Area H.Q. Seeks a New Home

OWING to the inadequacy of existing premises at Preston, a search is being made for a new site where there is accommodation for the whole of the headquarters' staff of the N.W. Electricity Board's No. 4 sub-area. At present the offices, workshops and stores are scattered throughout the sub-area and the nominal H.Q. in Lune Street houses but a skeleton of essential facilities. The Town's Planning and Development Committee has agreed to allocate some land in their development plans but much depends on whether the Board approves the plans, and, perhaps more important, on the Government's policy concerning capital expenditure.

In view of limitations in capital expenditure which the Midland Board found was a serious obstacle in similar circumstances (see our issue of January 18), it seems doubtful whether the new building will be available for some years, although the needs at Preston may be considered worthy of more immediate action. Even so the proposed site would probably be sufficient to accommodate only the offices, and tentative plans are being made to use part of the Dock estate for workshops and stores.

N.C.B. University Scholarships

FOR the fourth year the National Coal Board is offering up to 100 university scholarships, most of which will be made to read mining engineering, but a few may be given to read mechanical and electrical engineering. A limited number may be for courses in fuel technology, some for men who want to make a career in the coking industry, and others for those who wish to specialise in power generation.

Top right is the new two-piece display unit which Ekco-Ensign have produced for the S.E. Electricity Board and which is being circulated to various showrooms in the Area. The main unit is 5 ft high and it was originally intended to illuminate both pieces but they had to be modified to comply with the new lighting restrictions. Right is one of Revo Electric's cooker displays now appearing in a number of showroom windows

The new cold cathode fluorescent lighting installed in the reconstructed booking hall at Victoria Station

of tubing, each of which is 5 ft in diameter. A single line of tubing, 47 ft long, gives additional local lighting at the ticket windows. These have been recessed behind glass panels over the booking office. The transformers for this and the six circular tubes are behind the walls on each side of the hall while those for the central feature are housed in boxes which form an important part of the design of the fittings.

First use of cold cathode fluorescent tubes on stations was when the Motspur Park-Chessington branch was opened on the then Southern Railway in 1938. Post-war installations in the Southern Region have included the continental boat-train platform for the "Golden Arrow" at Victoria, and the new booking hall at Hastings.

The scholarships will go to boys who reach high standards in the general certificate of education or the Scottish Leaving Certificate, boys and young men in the industry who have university entrance qualifications, and to certain graduates who want to extend their qualifications and fit themselves for some of the higher technical posts. Application forms can be obtained from the Board's Education Branch at Hobart House, Grosvenor Place, S.W.1.

New Submersible Floodlight

OVER 600 of a new type of submersible floodlight, designed by the G.E.C., have been ordered for the South Bank site of the Festival of Britain to illuminate fountains. The diving bell principle was adopted in the design, which consists of an external cylinder, closed at the top by a sheet of armour plate glass. Inside this is a second cylinder closed at the bottom. The whole measures only 12 in. in height and has a diameter of 8 in.

A 150 W spotlight reflector lamp with internally silvered bulb is housed in the inner cylinder and water is prevented from reaching it by the pressure of air trapped under the top cover. Special precautions have also been taken to seal the metal box containing the connector so that no air escapes along the cable from inside the unit. An important point is the accessibility of the lamp chamber for replacement, and this is a simple process because there is no watertight joint to break and reseal when the necessity arises.

Cold Cathode for Railway Stations

SINCE the war, cold cathode fluorescent lamps have been a popular type of lighting for railway stations. Latest use of this lamp was in the reconstruction of the eastern section booking hall at Victoria, which was opened to the public on Monday. It is a fine example of decorative lighting which has not been achieved at the expense of efficiency. Over the centre of the hall there is a rectangular feature 31 ft by 12 ft composed of standard G.E.C. three-tube units placed end to end. This is supplemented by six double circles

New E.A.W. Branch

THE 114th branch of E.A.W. was formed at Darlington last Thursday at a meeting at the Technical College, presided over by Clr. Mrs. M. Lyonette. Dame Caroline Haslett outlined the aims and achievements of the association and another speaker was Mr. T. E. Daniel, deputy chairman of the N.E. Electricity Board. Lady Starmer became the branch's first president.

Twelve Million Man-hours Relax

THE human equivalent of more than twelve million man-hours of effort and service was represented at the fifth annual reunion of the B.T.H. Willesden Long Service Association, held at the Town Hall, Wembley, last Thursday.

Mr. E. H. Ball (right), managing director of B.T.H., presenting a 25-year-service certificate to Mr. E. E. Jeffs of the drawing office at B.T.H. (Willesden) Long Service Association's fifth annual reunion at Wembley Town Hall last Thursday

Membership of the Association is open to those with 20 years' continuous, or 25 years' non-continuous, service but many have achieved 30 and a few, 40 years' service. With sweethearts and wives, a total of six hundred odd enjoyed themselves at the reunion, with dancing and an excellent cabaret. During the course of the evening Mr. E. H. Ball (managing director, B.T.H. Co., Ltd.), who is himself a member of the Rugby L.S.A., and an honorary member of the Willesden L.S.A., presented 30-year certificates to 16 members (17 others also qualified but were unable to be present) and 25-year certificates to seven members (five others qualifying but being absent).

G.E.C.-North British Electric Locos

WE regret that a photograph in our "Progress in Production" series of January 25 was wrongly captioned. This caption stated that a 1,500 V locomotive for Estoril, Portugal was built by G.E.C. and Vulcan; in fact, the locomotive was built by G.E.C. in conjunction with the North British Locomotive Co., Ltd., of Glasgow. The same company is also associated with G.E.C. in the construction of forty 3,000 h.p., 3,000 V locomotives of 3 ft 6 in. gauge for South African Railways.

NEWS IN BRIEF

The S.W. Scotland Electricity Board and E.D.A. have co-operated to exhibit electrical equipment for the dairy farmer at the Scottish Dairy Show to be held at Kelvin Hall, Glasgow from February 13 to 17. Besides the display of apparatus, there will be cinema for showing of the latest E.D.A. films on dairy farming.

A new automatic telephone exchange, "Tate Gallery," with an initial capacity of 2,000 direct exchange lines has been opened recently in London.

Visitors to the works of Dewrance and Co., Ltd. during 1950 will be interested to learn that contributions to the charities box amounted to nearly £50. The money has been distributed to local charities including Guy's Hospital and Royal Eye Hospital.

Crompton Parkinson, Ltd., are to give practical demonstrations of stud welding at Holland and Hannen and Cubitts, Ltd., 258 Grays Inn Road, W.C.1, from February 19 to 23. Methods of fixing by end-welded studs will be shown and visitors invited to operate for themselves the Nelson stud-welding gun.

Questions in Parliament

Atomic Power

The Minister of Supply was asked what contribution was now being made to the fuel and power situation by the atomic energy plants under his control. He replied, "None." Later he was asked whether, in view of the present fuel situation, some hope that atomic energy could be used as fuel and power? To which he replied that the matter was being given serious consideration, but it would be some time before atomic energy could be used for heating purposes.

Capital Expenditure

Capt. Duncan asked the Chancellor of the Exchequer what allocations of capital to be spent in 1951-52 for the generation and distribution of electricity had been made to the B.E.A. and the North of Scotland Hydro-Electric Board? Mr. Gaitskell answered that publication of the Economic Survey for 1951—probably in March—must be awaited.

Coal Situation

The debate in the House of Commons last Thursday on the fuel situation was opened by Mr. Brendan Bracken, who referred to the present crisis as having been long foretold. Replying, Mr. Noel-Baker said that in the Economic Survey for 1950, estimated total production of deep-mined and open-cast coal was put at between 218 and 223 million tons, with inland consumption at 199 to 201 million tons. Put open-cast production was over 800,000 tons down, while consumption had increased to 202,500,000 tons. Stocks at October 31 were under 16 million tons, and by cutting exports it had been hoped that by the end of December last they would be 14 million tons. Home consumption had, however, increased, coming from full employment, more production and more gas and electricity in the home. And with rearmament it was uncertain that the increase in consumption in 1951 will be less than the 7½ million tons in 1950.

Their greatest immediate anxiety was about stocks for the power stations. The most serious single blow that could be struck at industry and the housewife would be the shutting down of power stations for want of coal. During the last eight weeks the power stations had used enormous quantities of coal. In one week the use of electricity generated was 23% more than in the corresponding week a year ago. Stocks had fallen to about one million tons short of what they wanted.

Power stations had been given over-riding priority, but they used the same coal as industry, and the only way to get the extra coal was to deliver less to industry than had been planned. That was a matter of regret. Unless there was prolonged harsh weather, it was hoped that the under-delivery would be roughly 15%. It was agreed with the Federation of British Industries that while the cut remained at that figure it should be applied equally to every section of industry. The Federation also suggested the provision of oil for the stand-by diesel generating plant

possessed by many firms, and which in many cases today they are not using, or are not using fully. That might provide 5% of the power industry used now. The Government still hoped the oil companies would obtain at least some of the oil required, and that some firms, if not all, could use their stand-by plants to full capacity in the next few months.

Mr. Noel-Baker then announced that, on representations from the National Coal Board, the Government had approved an increase in the pithead price of coal of 4s. 2d. a ton, as from February 5, except for house coal, in which case the increase would be from February 12. After referring to other measures of economy, mentioning the restriction on shop window and advertising lighting which would save 50,000 tons of coal in three months, the Minister was asked what was being done about the sale of still further electrical apparatus. He replied that most of the Electricity Boards had stopped sales of fires, but private concerns were still selling these. In conjunction with the Boards, the Association of Manufacturers is advising its members to use less electricity and gas. Mr. Brendan Bracken then asked if the Boards had been allowing hire-purchase terms more generous than those offered by private manufacturers. This the Minister denied, adding that with reasonable care, 1,000,000 tons of coal could be saved in the next three months in shops, offices and homes in the form mainly of electricity or gas. Mr. Boyd-Carpenter also raised the matter of appliances on hire-purchase, quoting from the B.E.A. reports for 1948-9 and 1949-50, and referred to consumer guarantees for the consumption of a certain quantity of electricity. Pointing out that the demand for electricity since 1938 had increased by about 125%, involving the use of 18 millions more tons of coal at power stations, Mr. Redmayne stressed that the domestic consumer had increased the coal used for electricity by about 7 million tons of the 18 million, farms and offices taking a share of 1½ million. Thus industry has taken only 9 million tons. After observing that the change had resulted in a most wasteful use of electricity for space heating, he advocated the use of some method of giving warning of power cuts. Winding up the debate, Mr. Robens remarked that the demands of industry, of power stations and gas works were still rising, from 96 million tons in 1948 to 104 million in 1950, and referred to the efforts of the Ministry in advocating more efficient use of fuel.

H.-P. Facilities

No direction had been given to the B.E.A. regarding the limitation of hire-purchasing facilities, Mr. Noel-Baker stated in a written reply to Mr. Redmayne. Later, when Mr. Marlowe asked why no such direction had been given, the Minister said the policy was to restrict borrowing for extension of h.-p. facilities. The Electricity Boards did not borrow for this purpose, but financed h.-p. from their trading surplus. The value of such sales was less than a third of similar sales by the supply industry before the war. He was considering whether restrictions were required, but was reluctant to make it impossible for poor people to buy cookers, vacuum cleaners and other labour saving devices.

Generator Exports

How many generators exceeding 10 MW were expected in 1950 and to what countries did they go, Mr. Bottomley was asked. He replied that separate figures of sets up to 10 MW were not available, but gave the following data received from manufacturers regarding sets produced for export from January to November, 1950:

Steam turbo-alternators 10 MW and above

Australia	9 sets
Canada	5 ,,
South Africa	4 ,,
India	4 ,,
Iraq	2 ,,
Abadan (Persian Gulf)	2 ,,
Southern Rhodesia	1 ,,
Mexico	1 ,,
Malaya	1 ,,
Hong Kong	1 ,,
Venezuela	1 ,,
Total No. of sets	31

Hydro-electric plant 10,000 b.h.p. and above

Portugal	4 sets
Australia	3 ,,
India	2 ,,
Spain	1 ,,
Total No. of sets	10

When then asked if he would ban the export of generators, particularly to Russia, at a time when these were needed at home to offset power cuts by the B.E.A., he answered, "No." He assumed smaller type of units, suitable for factories, were referred to. Exports of these had not in any way interfered with the satisfaction of demand at home, but the position would be kept under review.

Lord Citrine's Speech

The Minister of Fuel and Power was asked by Mr. Boyd Carpenter, if he proposed to dismiss Lord Citrine because of his recent speech in which he said that the Government's failure to provide enough money for generating stations might cause the country's electricity system to collapse? Mr. Noel-Baker replied "No," and he did not accept that interpretation of Lord Citrine's speech.

Power Cut Warnings

In a written reply to a question about load shedding, Mr. Noel-Baker stated that at a recent conference of representatives of the B.E.A. Area Boards and Consultative Councils, it was arranged to examine urgently a number of suggestions for improving the present warning system. He hoped to make a further statement on the matter shortly. Replying to Mr. Steward, he also explained that the Boards maintained their declared voltage and frequency of supply as far as was possible in the present circumstances. He felt sure most consumers preferred any inconvenience which this might cause rather than have the supply cut off.

Electric Supply News

Aberystwyth

This diesel generating station, at present of 3,070 kW capacity, in the Merseyside and North Wales Division, is being extended by the installation of three 750 kW sets. The first of these is now in process of erection at the station. It comprises a 12-cylinder General Motors diesel engine developing 1,000 b.h.p. at 750 r.p.m., coupled to a 750 kW Brush alternator. Two other units of similar size are to be installed by the end of 1951.

Edinburgh

The International Combustion Ltd. boiler installed last year at Portobello power station is of 540 klb/hr evaporative capacity, not 450 klb/hr as was given in the B.E.A. data published on page 158 of our January 25 issue.

North of Scotland

Three extensions to the North of Scotland Hydro Electric Board's supply lines north of the Great Glen have just been completed, connecting up Fort-Augustus, Kiltarlity and North Kessock. The Board's main distribution line from Beauly, which supplies Milton, Lewiston and Drumnadrochit, has been extended by 15 miles to take power to Fort-Augustus, and approximately 120 premises in the neighbourhood, including the manse and the Abbey, which previously had its own generating plant and supply houses nearby, wired.

Another extension to the Beauly-Drumnadrochit line was required to take electricity to Kiltarlity. That extension connects the line from Fasnakyle, supplying the communities at Cannich, Struy, Erchless and Hughton, to the main 33 kV line at Kiltarlity. Approximately 70 homes, farms and crofts in the area have been connected.

To take electricity to North Kessock, seven miles of h.t. and l.t. lines had to be erected. Thirty-five homes have already been connected to the supply, and a further 65 premises wired.

North Western

The North Western Electricity Board is formulating a uniform tariff for large power users. Until this is introduced an all-in tariff is to apply for new supplies. This is arranged in three categories: (*a*) where the step-down transformer is the Board's, and metering is l.v.; (*b*) using Board's transformers and with h.v. metering; and (*c*) using consumer's transformers with h.v. metering. Respective charges per kW per month are:—

	(*a*)	(*b*)	(*c*)
	s. d.	s. d.	s. d.
First 100 kW	11 8	11 5	11 2
Next 100 kW	10 0	9 9	9 6
Next 100 kW	8 4	8 1	7 10
Next 500 kW	7 6	7 3	7 0
Excess kW	6 8	6 5	6 2

Arrangement is made for adjustment for improved power factor. The running charges, based on fuel at 38s. per ton, are 0·48d. p.u. for first 200 units per kW per month; 0·42d. p.u. for next 300 per kW per month; and 0·38d. p.u. for over. There is an increase or decrease of 0·01d. per kW/hr for each shilling above or below 38s. per ton for fuel.

LIGHTING SCHEMES

Boldon (Co. Durham).—The U.D.C. has instructed the surveyor to proceed with the provision of 39 electric street lighting units on the West Boldon housing site at a cost of £1,282. The Council has decided that its street lighting programme at Boldon Colliery should include sodium lamps.

Chaddesden.—The Parish Council is to apply to the Derbyshire C.C. for consent to borrow £6,500 for improving street lighting.

Felling-on-Tyne.—The Urban Council will let contracts within a few weeks for the provision and erection of concrete street lighting columns with lanterns on the Ellen Wilkinson housing scheme.

Finchley.—The B.C. is preparing a scheme for using sodium lighting on part of the North Circular Road.

Omagh.—The U.D.C. is to obtain quotations for lighting of the main streets on the same system as Lisburn, and the side streets on the same method as the main streets of Portadown.

Company Activities

Electrical and Industrial Investment

For 1950, revenue amounted to £88,029 compared with £85,944 in the previous year. General expenses absorb £2,412 (*£2,456*), directors' fees £1,500 (*same*), debenture interest £8,000 (*same*), interest £556 (*£2,379*), taxation £36,500 (*£32,456*), leaving a balance of £39,061 as against £39,153 in the previous twelve months. The dividend on the Deferred shares is again 20%, and the undivided profits account amounts to £20,911 (*£21,003*).

Pye Ltd.

The subscription list opens and closes today, Thursday, for the issue of 750,000 5% Cumulative Preference £1 shares, at the price of 20s. 9d. per share. The prospectus was advertised on Monday last.

Thorn Electrical Industries

At last Friday's extra-ordinary meeting, the capital proposals were approved by shareholders. An offer will now be made of 352,500 new Ordinary 5s. shares to shareholders, at 15s. 6d. each, in the proportion of one for every two Ordinary held. There will also be a subsequent free issue, by way of capitalisation of part of the share premium account, of 1,057,500 new Ordinary shares, on a one-for-one basis.

Commercial Information

CONTRACTS OPEN

HOME

Feb. 9.—Bridgnorth T.C. Installation of electric light at W. Midlands Gas Board showrooms. Borough Surveyor's Dept., College House.

Feb. 9.—Manchester. Electrical installation in Didsbury College. City Architect, Town Hall. Deposit £1 1s.

Feb. 10. — Banbridge R.D.C. Electric light installations in 12 houses at Lisnafiffy. D. W. Chambers, Architect, Town Hall. Deposit £2 2s.

Feb. 10.—Bute. Electrical work in erection of 16 houses. Applications by above date to Robert Rennie, chartered architect, 33 Vernon St., Saltcoats.

Feb. 10.—Lancashire. Renewal of electrical installations at Rawtenstall Alder Grange secondary modern school. Applications by above date to G. Noel Hill, County Architect, County Offices, Preston. Deposit £2.

Feb. 10.—Leeds. Supply and delivery of 660 V cables of various sizes, paper insulated lead-covered single wire armoured, for Knostrop sewage works. Length required is 3,150 lineal yards. Junction boxes and telephone wires also required. Sewerage Engineer, Civic Hall, Leeds 1.

Feb. 10.—Leigh T.C. Complete installation of approx. three miles of street lighting, comprising high-pressure mercury vapour discharge lamps mounted on concrete columns. John Walmesley, Borough Engineer and Surveyor, Town Hall, Leigh, Lancs.

Feb. 10. — Petworth (Sussex) R.D.C. Electrical wiring of 14 cottages at Plaistow. Building Surveyor, Newlands, Petworth.

Feb. 12.—Belfast. Electrical work at Edgecumbe House for C.C. City Surveyor's Dept., Architectural Section, City Hall. Deposit £3 3s.

Feb. 12.—Felling U.D.C. Provision and erection of concrete street columns and lanterns on Ellen Wilkinson estate, Wardley. H. Fawcett, Surveyor, Council Buildings, Felling.

Feb. 12.—Lancaster. Supply of 8 street lighting lanterns and lamps for Skerton Bridge, on A.6. City Engineer, Town Hall. (See Jan. 25 issue.)

Feb. 12.—N. Ireland. Electrical installation in (*a*) 57 dwellings at Hillsborough, Co. Down; and (*b*) 118 dwellings at Londonderry. Separate tenders required. Housing Trust, 12 Hope St., Belfast. Deposit 10s. each.

Feb. 14.—Billericay U.D.C. Provision and erection of 13 sodium discharge lamps on concrete columns at Laindon. Surveyor to Council, 98 High St.

Feb. 14.—Blackpool T.C. Electrical installation in Arnold High School for girls. Applications by above date to Arthur Hamilton, Borough Surveyor, Municipal Buildings.

Feb. 14.—Dublin. Supply of four mobile tower ladders. City Engineer's Office, 28 Castle St. (See Feb. 1 issue.)

Feb. 14.—Gillingham T.C. Annual supplies for 12 months beginning April 1 include electrical switches, conduit, wire, cables, and all accessories; also electric cooker, wash boiler and fire spares, and electrical stores (lamps, etc.). Borough Engineer and Surveyor, Municipal Bldgs.

Feb. 14.—Prestwich T.C. (*a*) Supply, and (*b*) erection of 36 concrete lighting columns, (*c*) supply of 36 lanterns, (*d*) supply of 36 140 V sodium discharge lamps and control gear, and (*e*) installation of electrical equipment. Borough engineer, Town Hall, Prestwich. Deposit £2 2s. each.

Feb. 14.—Wolverhampton. Electrical installation at Warstones West primary school. Applications by above date to Borough Engineer, Town Hall. Deposit £2 2s.

Feb. 16.—Belfast. Supply and erection of mercury arc rectifier equipment. Electricity Dept., East Bridge St., Belfast. Deposit £2 2s. (See Jan. 25 issue.)

Feb. 17.—Horwich. U.D.C. Supply of tungsten and sodium lamps included in lists of requirements for 12 months ending March 31, 1952. No forms of tender will be issued. T. Roscoe, Clerk of the Council, Council Offices, Horwich, Lancs.

Feb. 17.—King's Lynn T.C. Supply of electric lamps for year ending March 31, 1952. Borough Engineer, H. G. Ridler, 27 Queen St.

Feb. 17.—Solihull U.D.C. Annual tenders for year commencing April 1 includes supply of electrical fittings and bulbs. Engineer and Surveyor, 90 Station Rd.

Feb. 19.—Skelton and Brotton U.D.C. Electrical wiring and installation of fittings in 20 houses on Brotton Coach Rd. estate. Engineer and Surveyor, Council Offices, Skelton-in-Cleveland. (See Feb. 1 issue.)

Feb. 20.—Derbyshire. Part of annual contracts includes electric conduit, lamps, and accessories. Suppliers for year commencing April 1. Applications to County Architect, St. Mary's Gate, Derby, by Feb. 9.

Feb. 20.—Dewsbury T.C. Electrical installation in 112 houses on Chickenley Lane estate, 22 houses on School Lane estate and 8 in Staincliffe Rd. Office of Borough Architect and Building Surveyor, Town Hall.

Feb. 20.—Poole T.C. Supply of electric lamp bulbs, cables, fittings, etc., water heaters, street lighting lanterns and concrete columns, conduits and wiring accessories, included in annual lists for period ending March 31, 1952. J. R. Barron, Borough Engineer and Surveyor, Municipal Buildings.

Feb. 20.—Sligo C.C. Complete electrical installation in proposed conversion of the Girls' High School, Sligo, into a T.B. Hospital. Details from J. A. Kenny and Partners, consulting engineers, 44 Kildare St., Dublin. Deposit £15 15s.

Feb. 21.—High Wycombe T.C. Thirty-two concrete lighting columns, including lanterns for 250 W horizontal MV lamps, etc., for Hughenden Rd. Particulars from Borough Engineer's Dept., Municipal Offices, High Wycombe. Deposit £2 2s. (See Jan. 25 issue.)

Feb. 21.—Rochdale. Installation of ventilating fans and ducting in Market Hall. Borough Surveyor, Town Hall.

Feb. 21.—Thingoe R.D.C. Wiring of 89 houses, including provision of light and power points. S. M. Casson, 1 Northgate St., Bury St. Edmunds.

Feb. 21.—Tynemouth T.C. List of supplies for year ending March 31, 1952, includes electric lamps and cables, lamp columns and reflectors. Borough Surveyor, D. M. O'Herlihy, 16 Northumberland Sq., North Shields.

Feb. 23.—Inverurie T.C. Electrical installation in erection of 20 houses on Kellands site. Burgh Surveyor, Town House.

Feb. 24.—Dagenham. Supply and erection of 217 Group A lighting units in Valence Ave., Rainham Rd., Whalebone Lane North, and Parsloes Ave. Borough Engineer and Surveyor, Civic Centre. (Advertised in this issue.)

Feb. 24.—Swansea T.C. Electrical installation in 44 flats at New St. Applications by above date to Borough Architect, Guildhall, Swansea. Deposit £2. (Advertised in this issue.)

Feb. 26. — Atherstone U.D.C. Supply and erection of street lighting equipment on trunk rd. A47 including concrete columns and lanterns. D. C. Smith, Engineer and Surveyor, Council Offices, Long St. Deposit £2 2s. (See Feb. 1 issue.)

Feb. 26.—Bedworth U.D.C. Supply and erection of automatic booster installation, comprising two electrically driven pumps of 60,000 g.p.h. with switchgear, etc., for Saunders Av. pumping station. C. S. B. Cooper, Water Engineer, Council Offices, High St.

Feb. 26.—Runcorn U.D.C. Supply of electric lamps as part of annual contracts for 12 months ending March 31, 1952. T. J. Lewis, Clerk of the Council, Town Hall.

Feb. 26.—Salford. Complete electrical installation at primary school in Summerville Rd. City Engineer, Town Hall, Bexley Square, Salford 3. (See Feb. 1 issue.)

Feb. 26.—Manchester. Electrical installation at Charlestown Infants' School in Pilkington Rd. City Architect, Town Hall. Deposit £1 1s.

Feb. 27.—Thurrock U.D.C. Installation of approx. 1,559 refrigerators (of which about 1,395 will be operated by electricity in existing council houses. Details from A. E. Poole, Clerk of the Council, Council Offices, Whitehall Lane, Grays, Essex. Deposit £3 3s. (Advertised in this issue.)

Feb. 28.—Dewsbury T.C. Supply of electric lamps, cable, 100-200 W lanterns with swan neck brackets, 300-500 W lanterns, c.i. steel and concrete lighting standards, paint, glass, uniform jackets, etc. Street Lighting Superintendent, 27 Battye St., Dewsbury. (See Jan. 25 issue.)

March 7.—Dublin. Two complete sets of rectifier equipment, having output of 1,000 amp at 500 V. Also supply of one 400 kVA transformer for Port and Docks Board. Engineer's office, East Wall Rd., Dublin.

March 19.—North of Scotland H.E. Board. Forty miles of 132 kV steel tower o.h. line, between Beauly and Shin. Apply to Strain and Robertson, 154 West George St., Glasgow, C.2. Deposit £2 2s. (See Jan. 25 issue.)

No date stated.—Aberdeen. Electrical work in alterations at Frederick St. junior secondary school. J. A. O. Allan, Ross and Allan, Architects, 10 Bon-Accord Sq.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Feb. 20.—Wellington (N.Z.). Post and Telegraph Dept. invites tenders for 330 milliameters, d.c. flush mounting, approx. 2½ in. diameter moving coil centre-zero, non-differential. Director-General (Stores Division), G.P.O., Wellington C.1.

Feb. 26.—Wellington (N.Z.). Post and Telegraph Dept. require 2,000 capacitors 2 mfd + 0·1 mfd. Director General (Stores Division), G.P.O., Wellington C.1.

Feb. 27.—Melbourne. Dept. of Civil Aviation requires supply of 264,000 yd of rubber insulated underground cable suitable for pressure of 1,000 V on unearthed system. Secretary, 522 Little Collins St., Melbourne.

March 6.—Melbourne. Supply of constant current regulators, static core type (primary power supply 415 V) for Dept. of Civil Aviation, 522 Little Collins St., Melbourne.

March 7.—Capetown. Electricity Dept. invites tenders for (1) transformers, each with continuous maximum rating of 300 kVA suitable for forming bank of 900 kVA with a spare unit; (2) 20 transformers max. rating of 750 kVA; (3) 20 on-load tap chargers for fitting to 750 kVA transformers; (4) four 500 kVA, six 300 kVA and one 250 kVA transformers; (5) three transformers for pole mounting, each with max. rating of 100 kVA. City Electrical Engineer, Electricity House, Strand St., Capetown.

March 7.—Queensland. The State Electricity Commission invites tenders for the supply of

Your Queries — Answered

"Sentinel" cartridge fuses, makers of? A.P.—Electric Control and Eng. Ltd., Camperdown, Sydney, Australia. (19387)

"Seagull" fluorescent fittings, makers of? T.E.—Longford Electric Co., Ltd., 6-8 Grosvenor St., Manchester 1. (19392)

"Sanford" fluorescent starter switches, makers of? L.B.—Sanford (Electrical Supplies) Ltd., 122 Ilford Lane, Ilford. (19396)

"Meco Comet" switch plug, makers of? L.B.—Marshall Electrical Co., Ltd., 4 Tottenham Mews, W.1. (19402)

"Ressel" irons, makers of? C.E.—S. Lesser and Sons (1928) Ltd., Town Hall Buildings, Mare St., E.8. (19405)

FURTHER ANSWER

"Zephyr" hairdryers, makers of? T.B.—The Bylock Electric Ltd., South St., Enfield, Middx inform us that they produce hairdryers under the name "Zephyr" and have done so for a number of years. (19382)

The above are selected from questions we have answered this week. If you have a query, send it to us.

a number of switchboard panels. B.o.T. (Ref. CRE (IB) 51683/51.)

March 12.—Cape Province (S.A.). Supply and installation of two 50 b.h.p. and one 30 b.h.p. oil engines with fuel and water-cooling tanks, two 35 kW and one 20 kW 220 V alternator equipped with switchboard. Documents from Consulting Engineer, P. W. Smart, Stellenbosch, Cape Province. Dep. £5.

March 15.—Thailand. Railway Dept., Bangkok requires a supply of paper insulated or rubber insulated underground cables for use in signalling.

April 2.—Auckland (N.Z.). Electric Power Board invites tenders for fifty-five 300 kVA and eight 450 kVA transformers for connection to 6,350 V and 6,600 V systems. Power Board Building, Queen St., Auckland. B.o.T. (Ref. CRE (IB) 51965/51).*

April 3.—Melbourne. Supply of insulated copper winding, resistance and fuse wires for Dept. of Civil Aviation, 522 Little Collins St., Melbourne.

April 5.—Brisbane. Supply of one 7,000 kVA, 3kV/5·2kV indoor type transformer for City Electric Light Co., Brisbane. B.o.T. (Ref. CRE (IB) 51608/51)*.

April 20.—Brisbane. Supply of six 7,500 kVA, 30,000 V to 11,000 V step-down outdoor transformers for City Council. B.o.T. (Ref. CRE (IB) 5235.).

CONTRACTS PLACED

B.E.A. Cables and accessories, North Tees power station, British Insulated Callender's Cables Ltd.; Auxiliary switchgear and accessories, Roosecote power station, English Electric Co., Ltd.; Coal handling plant, East Yelland power station, nr. Barnstaple, Strachan and Henshaw; 132 kV 3,500 MVA switchgear, Portishead power station, Metropolitan-Vickers Co., Ltd.; same at Drakelow power station, A. Reyrolle and Co., Ltd.; Modifications to 132 kV 1,500 MVA switchgear, Ocker Hill substation, General Electric Co., Ltd.; 30 MVA 66/11 kV transformers at St. Pancras substation, British Electric Transformer Co., Ltd.; and 20 MVA 132/11 kV, 15 MVA 132/11 kV transformers and auxiliary transformers for Bathgate and Devonside substations, Bruce Peebles and Co.

Kidderminster. Installation of electricity in 332 houses, Messrs. Wilcox Bros., £5,400.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	202 0 0	£196 0 0
Delivered in 2nd and 3rd month after order	215 10 0	—
Delivered in 4th, 5th and 6th month after order	217 0 0	—
LEAD, good soft pig (foreign)	136 0 0	136 0 0
" " " "English" quality	137 10 0	—
Delivered in 2nd and 3rd month after order, plus	7 0 0	—
TIN (99-99.75%) (Cash)	1430-1435	—
" (3 months)	1390-1395	—
ALUMINIUM, commercial purity (del.)	124 0 0	—
ZINC	151 0 0	140 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.)	45 10 0	—
Mild Steel Tape (0·04 in.)	26 0 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Guardalarms Ltd. John MacBeath, Chartered Accountant, 32 Church St., Inverness, has been appointed liquidator, to whom creditors should send particulars by Feb. 22.

Reliable Radio, 244 Desborough Rd., High Wycombe. Bankruptcy petition presented against the company at Aylesbury county court, and will be heard at the court, 25 Walton St., on Feb. 23 at 11.30 a.m.

London. Rentalec Ltd., 36 Bruton Place, W.1, dealers in electrical equipment. Meetings of creditors and contributories at Inveresk House, Strand, W.C.2, on Feb. 8, at 11.30 a.m. and 12 noon respectively.

BANKRUPTCY ACTS

First Meeting

Dewsbury. Harry Sykes, electrical engineer trading at 22 Queen St., Morley. First meeting at Official Receiver's Office, 71 Manningham Lane, Bradford, on Feb. 9 at 11.30 a.m. and public examination at County Court House, Eightlands, Dewsbury, on March 29 at 10.30 a.m.

Receiving Order

Yeovil. Harold L. Snelgrove, refrigerator engineer trading at East St., West Coker. Date of receiving order, Jan. 22.

Appointment of Trustee

Aylesbury. Leonard George Sharp, electrician, 4 Summerley's Rd., Princes Risborough, Bucks. Trustee is J. H. Marshall, chartered accountant, High St., Princes Risborough.

TRADE NOTES

Acquisition.—Dorman Smith Holdings Ltd. announce that they have acquired a modern iron foundry which will be operated by their wholly owned subsidiary John Booth Foundries Ltd., Derby St., Preston.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

Ajax Accumulators (Uxbridge) Ltd., Cowley Rd., Uxbridge. Cap.: £400. Dirs.: E. P. Bowler, J. R. Pettit, L. Hughes and D. Caeser.

Browning's Electric (Commutators) Ltd., Boleyn Castle, Green St., Upton Park, E.13. Electrical contractors, manufacturers of and dealers in commutators, sliprings and brush gear, etc. Cap.: £1,000. Dirs.: W. H. Browning and Hilda M. Browning, R. W. Browning and Betty M. Browning.

D. J. Clarke (Biggleswade), Ltd., 4 Shortmead St., Biggleswade, Beds. Retailers and manufacturers of and dealers in electrical goods and appliances, etc. Cap.: £500. Dirs.: D. J. Clarke, Ruby Clarke and V. A. Tofts.

Electromatic Display Ltd., 16 Bryanston St., W.1. Window display specialists and contractors, manufacturers of and dealers in electrical display and advertising figures, etc. Cap.: £500. Dirs.: D. M. Glassberg and C. Listinger.

Inventrix Ltd., 24a Irwell Chambers West, Fazakerley St., Liverpool 3. Importers and exporters of and dealers in toys, electrical and mechanical products, etc. Cap.: £200. Dirs.: C. H. Machen, E. Gardner, R. Nickson and A. Crompton.

BUSINESS PROSPECTS

HOME

Birmingham. Erection of 107 houses and bungalows at Wesley Castle. H. J. Manzoni, City Engineer and Surveyor, Civic Centre.

Brighton T.C. Application to be made to borrow £42,872 for erection of 52 flats on Parkside estate, Coldean.

Carlisle. Scheme approved for erection of infants' school at Harraby at a cost of £48,000. City Surveyor, 18 Fisher St.

Carlton (Notts) U.D.C. Erection of 28 flats on Cross St. site, and 4 on Simkin Ave. site. J. R. Campbell, Engineer and Surveyor, Council House, Burton Road.

Chelsea. It is proposed to erect 86 flats in six blocks in third stage of development of West Chelsea (No. 1) Area.

Chorley. Construction of 6, 6, 5 and 48 houses under different contracts on Tootell St. site. Borough Engineer, Town Hall.

Crickhowell (Brecon). R.D.C. proposes to build 6 houses each at Brynglas and Gilwern, 4 each on eight different sites and 2 each at Ffynoran and Crickhowell.

Derbyshire. Erection of Staveley Inkersall county primary and N. Wingfield county secondary schools. County Architect, County Offices, St. Mary's Gate, Derby.

Drogheda. Erection of 128 houses at Glenview. J. Carr, Town Clerk, Town Clerk's Office, Court House, Drogheda.

Durham. Primary school is to be built at Stainton Camp, Barnard Castle. County Architect, Court Lane.

East Grinstead. Tunbridge Wells Hospital Management Committee is seeking approval for rebuilding out-patients' dept., and construction of children's ward at Queen Victoria Hotel, total estimated cost being £39,000.

Edinburgh. Dean of Guild Court has approved plans for erection of 302 houses at The Inch, Liberton, at estimated cost of £477,000.

Glasgow. Plans approved for erection of flats for old people—28 at Mansewood costing £40,740, and 36 at Merrylee Rd., at £52,380.

Gosport T.C. 100 houses to be erected.

Greenock. Plans approved for erection of a hospital at Larkfield.

Heckmondwike (Yorks) U.D.C. Plans approved for a further 156 houses and 8 shops on Dale Lane estate.

Holland. Erection of Kirtwood secondary modern school. County Architect, County Hall, Boston.

Kendal T.C. Erection of 46 dwellings on Hallgarth estate. J. Barnfather, Borough Engineer and Surveyor, Municipal Offices, Lowther St.

Kirkby - in - Ashfield (Notts) U.D.C. Scheme has been approved for erection of 20 houses in Southwell Lane.

Leicester. E.C. has approved the building of an infants' school at Overdale Rd. at estimated cost of £66,200.

Liverpool. Erection of technical college for women in Colquitt St. City Architect and Director of Housing, Blackburn Chambers, Dale St., Kingsway, Liverpool 2.

Lutterworth (Leics.) R.D.C. Construction of 20 houses in borough and another 20 on four sites.

Newcastle - on - Tyne. Primary school in Broadwood Rd. City Architect, G. Kenyon, 18 Cloth Market. Newcastle.

Ossett T.C. Erection of 50 houses on Swithenbank estate. Borough Surveyor, Town Hall.

Penzance T.C. Construction of 16, 8, and 6 houses on Alverston Estate, Borough Surveyor, Municipal Buildings.

Reigate T.C. Erection of 24 houses on Woodheath estate. Borough Engineer and Surveyor, Town Hall.

Sheffield T.C. Erection of 178 houses on the Basegreen estate. W. Geo. Davies, city architect, City Architect's Dept., Town Hall.

Sheffield. Regional Hospital Board has approved the following schemes: maternity unit at Melton Mowbray, £35,000; out-patients' depts. at Melton War Memorial Hospital (£2,000), and Hinckley Hospital (£4,000); maternity unit at Ashby Hospital, £7,000.

South Shields. Plans are in hand for renewal of electric wiring at Ocean Rd., Westcoe, Mowbray, Barnes, Gilbert St., and Stanhope Rd. schools. Cost will be about £11,000 and tenders to be invited.

Southwell (Notts) R.D.C. Erection of 20 houses on each of sites at Lowdham and Edwinstowe. Surveyor is S. Cooper, 8 Westgate.

West Bromwich T.C. Erection of 46 houses and flats on Harvills Hawthorn estate. Also erection of 8 shops and 4 flats. Applications in both cases to H. Schofield, Borough Engineer and Surveyor, Town Hall.

Weston-super-Mare T.C. Construction of 60 flats on Summerlands estate. J. Freer-Hewish, Borough Engineer and Surveyor, Town Hall.

Weymouth T.C. Scheme approved for erection of 138 flats in Stage 3 of Chapelhay redevelopment.

Wolverhampton T.C. Erection of 78 dwellings on Willenhall Rd., North estate. Director of Housing, Town Hall.

OVERSEAS

Peru. Andres Ratti e Lijos, S.A., Calle Pierola 117, Arequipa, desires to represent U.K. manufacturers of typewriters, calculating machines and radios in Southern Peru.

Venezuela. Almacien Americano C.A., Edificic Phelps, Veroes a 38 arras, Caracas, want to purchase low priced, 5-valve, short and long wave, table model radios; 8-valve and 5 wave-band table model receiver; and table model radio gramophone with 5-8 valves. Firms should contact the manager, Senor Ricardo Espina.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Electromaze. 693,037. Class 11. Electrostatic air and gas filters. Air-Maze Ltd., Church St., Warrington.

Muramic. 686,492. Class 17. Ceramic insulation parts for electrical apparatus. Steatite and Porcelain Products Ltd., Imperial Chemical House, Millbank, S.W.1.

Octopus. 688,193. Class 9. Cables, flexible conductors, switches, switch boxes, plug sockets, junction terminal boxes and assembly terminal blocks. Hartley Electromotives Ltd., 57 Victoria St., S.W.1.

MEETINGS TO NOTE

THURSDAY, FEB. 8

DUNFERMLINE ELECT. SOC.—"Electricity Applied to Farming." A. Cameron Brown. Unitas Hall, Queen Anne St., 7 p.m.

I.E.S. (Glasgow Centre).—"Effect of Artificial Lighting on Occupational Health." H. H. Bell, Inst. of Engrs. and Shipbuilders, Elmbank Crescent, Glasgow, 6 p.m.

I.E.S. (Manchester Centre).—"Scientific Relationship between Illumination and Photography." L. H. A. Carr. Coll. of Technology, Sackville St., Manchester 1, 6 p.m.

INSTN. OF WORKS MANAGERS (Wembley Sub-branch).—"The Study of the Mind." I. H. Child of B.T.H. "The Plough," Kenton Rd., Kenton, 12.30 p.m.

I.E.E. (N. Midland Centre).—"Application of Gas Turbine Technique to Steam Power." J. F. Field. The University, Leeds, 7 p.m.

I.E.E. (N.E. Scotland sub-centre).—"Fault Location on High Voltage Lines by an Electronic Method." D. W. Berry. Royal Hotel, Union St., Dundee, 7 p.m.

I.E.E. (Swansea Sub-centre).—"Polyphase Commutator Machines." B. Adkins and W. J. Gibbs. Plaza Cinema, 6 p.m.

FRIDAY, FEB. 9

I.E.S. (Birmingham Centre).—"Lighting for the Prevention of Industrial Accidents." E. W. Murray. Imperial Hotel, Temple St., 6 p.m.

I.E.S. (Leicester Centre).—"Floodlighting." R. O. Ackerley. E. Midlands Elect. Board, Charles St., 6.30 p.m.

I.E.E. (London Discussion Circle).—Discussion on "Teaching Mechanics to Engineers." Savoy Place, W.C.2, 6 p.m.

A.S.E.E. (Nottingham Branch).—"Application of High Frequency Heating." S. W. Burfitt. Elect. Showrooms, Smithy Row, 7.30 p.m.

A.S.E.E. (S.E. London Branch).—"Resistance Welding." E. C. Slade. S.E. London Technical College, Lewisham Way, 8.15 p.m.

I.E.E. (N.E. Scotland Sub-centre).—"Fault Location on High-Voltage Lines by an Electronic Method." D. W. Berry. Caledonia Hotel, Aberdeen, 7.30 p.m.

N.E. COAST INSTN. OF ENGRS. AND SHIPBUILDERS.—"Electrification of Shipyards." J. S. McCulloch. Mining Institute, Newcastle, 6.15 p.m.

MONDAY, FEB. 12

I.E.E. (London).—Discussion on "Inventor, Engineer and Manager." Informal meeting at Savoy Pl., W.C.2., 5.30 p.m.

I.E.E. (Norwich).—"Theoretical and Experimental Study of the Series-Connected Magnetic Amplifier." H. M. Gale and P. D. Atkinson. Royal Hotel, 7.30 p.m.

I.E.E. (N.E. Centre).—"Design of Power Transformers to withstand Surges due to Lightning." A. T. Chadwick, J. M. Ferguson, D. H. Ryder and G. F. Stearn. Nevill Hall, Westgate Rd., Newcastle, 6.15 p.m.

I.E.E. (S. Midland Supply and Utilisation Group).—"Some Experience with a British A.C. Network Analyser." G. Lyon. Imperial Hotel, Birmingham, 6 p.m.

I.E.E. (Western Centre).—"Planning of an Electricity Board's Distribution System." G. O. McLean. S. Wales Inst. of Engineers, Park Pl., Cardiff, 6 p.m.

A.S.E.E. (N.W. London Branch).—Lecturettes by branch members. "Prince of Wales," Kingsbury Rd., N.W.9., 7.15 p.m.

TUESDAY, FEB. 13

ELECT. POWER ENGRS'. ASSOC. (Midland Tech. Group).—"Electronics and Electronics in Industry." Films by B.T.H. Recreation Club, Hylton Rd., Worcester, 7 p.m.

INSTN. OF WORKS MANAGERS (W. Midland Branch).—"Work of the West Midlands Joint Electricity Board." W. Lewis. Grand Hotel, Birmingham, 7 p.m.

I.E.E. (London Measurements Section).—"The Inductor Compass." A. Hine. Savoy Pl., W.C.2, 5.30 p.m.

I.E.E. (Cambridge Radio Group).—"Crystal Diodes." R. W. Douglas and E. G. James; "Crystal Triodes." T. R. Scott. Cavendish Laboratory, 8.15 p.m.

I.E.E. (N.W. Centre).—"Standardisation and Simplification in Electrical Industry." J. T. Moore. Engineers' Club, Albert Sq., Manchester, 6.15 p.m.

I.E.E. (N. Ireland Centre).—"Noise and Radio Frequency Disturbance from Gas-filled Tubes." Prof. K. G. Emeleus. Queen's University, Belfast, 6.45 p.m.

INCORP. PLANT ENGRS. (E. Lancs Branch).—"Generation and Distribution of Electricity." R. A. S. Thwaites. Engineers' Club, Albert Sq., Manchester, 7.15 p.m.

INSTN. OF CIVIL ENGRS.—"Fundamental Economics in Hydro-electric Design." C. M. Roberts. Gr. George St., S.W.1, 5.30 p.m.

INST. OF ENGRG. INSPECTION (Coventry Branch).—"Electric Welding." F. A. Thomas. Tech. College, 7.30 p.m.

A.S.E.E. (S.W. London Branch).—"A Random Lighting Review." E. A. Langsdon. St. Georges Hall, St. Georges Rd., Wimbledon, 8.15 p.m.

WEDNESDAY, FEB. 14

NORTHAMPTON ELECT. ASSOC.—"Use of Multi-channel Systems, 12-channel Carrier and Co-axial Telephony and Voice Frequency Telegraphy." A. Hunt, 7 p.m.

I.E.E. (London).—Faraday lecture on "Lamps and Lighting—a Record of Industrial Research." L. J. Davies. Central Hall, Westminster, 6.30 p.m.

I.E.E. (Oxford).—"Electronic Control of Resistance Welders." B. G. Wiggins; "Electronic Motor Control." E. W. Forster. Elect. Showrooms, 37 George St., 7 p.m.

I.E.E. (Scottish Centre).—"A New Theory of the Magnetic Amplifier.' A. G. Milnes. Heriot-Watt College, Edinburgh, 7 p.m.

I.E.E. (Southern Centre).—Discussion on "The Trunk Telephone System." R.A.E. Tech. College, Farnborough, 7.30 p.m.

BRITISH INSTN. OF RADIO ENGRS. (S. Midlands Section).—"Survey of Television Development and Its Problems." H. J. Barton-Chapple. E.M.E.B., Coventry, 7.15 p.m.

BRITISH INSTN. OF RADIO ENGRS. (N.E. Section).—"Use of Foster's Theorem in Circuit Design." E. Williams. Neville Hall, Westgate Rd., Newcastle, 6 p.m.

I.E.E. (S. Midlands Students' Section).—"Electronic Motor Control." C. R. Bates. Jas. Watt Memorial Institute, 6.45 p.m.

A.S.E.E. (Bradford Branch).—"Aims and Objects of the A.S.E.E." L. L. Emmett. Midland Hotel, 7.30 p.m.

A.S.E.E. (Kent Branch).—Film lectures "Seascan Radar." Royal Star Hotel, Maidstone, 8 p.m.

THURSDAY, FEB. 15

I.E.S. (Gloucester and Cheltenham Centre).—"Sodium Lamps and Their Application." A. W. Gostt. Cadena Cafe, Eastgate St., Gloucester, 6.30 p.m.

I.E.S. (Nottingham Centre).—"Street Lighting." W. R. Stevens. Gas Showrooms, Parliament St., 5.30 p.m.

I.E.E. (London Utilisation Section).—"Dimming of Low-Pressure Discharge Lamps." C. E. Williams. Savoy Pl., W.C.2, 5.30 p.m.

I.E.E. (E. Midlands Centre).—"Evolution of the Lighting Art." J. W. T. Walsh. George Hotel, Kettering, 7.30 p.m.

I.E.E. (E. Midlands Centre).—"Planning of an Electricity Board's Distribution System." G. O. McLean. Corn Exchange, Spalding, 7.30 p.m.

I.E.E. (Rugby Sub-centre).—"Rationalised M.K.S. Units in Electrical Engineering Education." E. Bradshaw. E. Midlands Electricity Showrooms, High St., Rugby, 6.30 p.m.

I.E.E. (Irish Branch).—"Fifty Years of Telecommunications in Ireland." J. W. O'Neill. Trinity College, Dublin, 6 p.m.

FRIDAY, FEB. 16

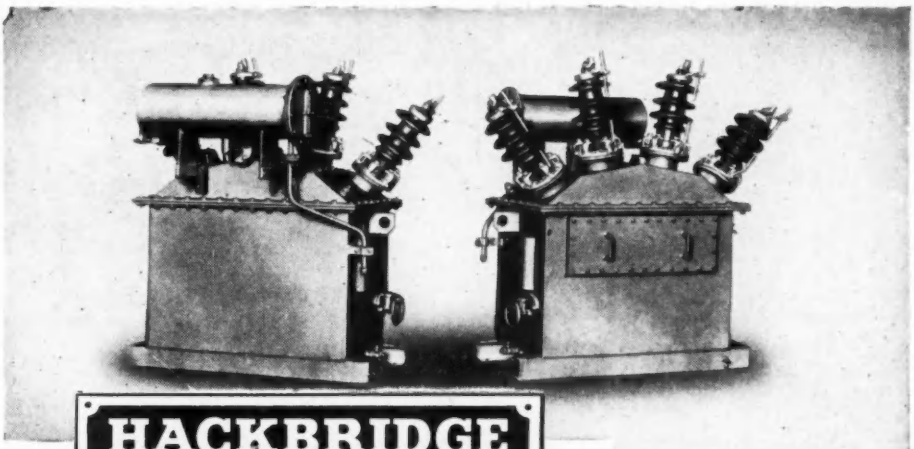
I.E.E. (N. Staffs Sub-centre).—"Review of Research in Electricity Supply." C. W. Marshall. Midland Electricity Showrooms, Stoke-on-Trent, 7 p.m.

I.E.E. (Western Centre and Swansea Sub-centre).—Dinner-dance and visit of President. Seabank Hotel, Porthcawl.

ELECT. TRADES' COMMERCIAL TRAVELLERS' ASSOC.—Annual luncheon. Connaught Rooms, W.C.2, 12.30 p.m.

SATURDAY, FEB. 17

A.S.E.E. (Manchester Branch).—"Electronics." J. E. Fielden. Engineers' Club, Albert Sq., 7.30 p.m.



HACKBRIDGE
TRANSFORMERS

for

POLE and PLATFORM MOUNTING

HACKBRIDGE pole and platform mounting transformers are a "gilt-edged investment" for any Distribution Authority, backed as they are by over a quarter of a century of design and manufacturing experience in association with many of the world's largest supply systems.

Electrically and mechanically robust and supremely reliable—designed for the job by engineers in close touch with the practical problems of distribution.

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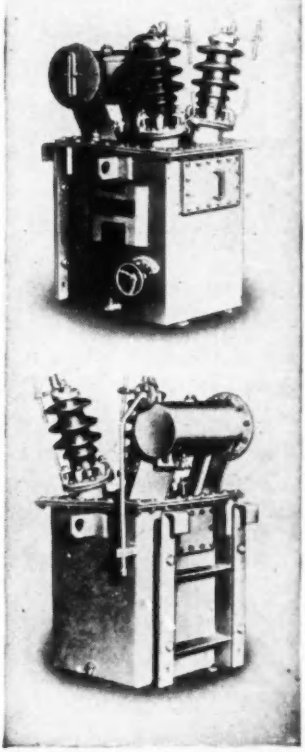


Illustrated:—

Above: Hackbridge pole-platform mounting transformer, 3-phase, 10 kVA. 22,000/400 volts (with fully insulated neutral).

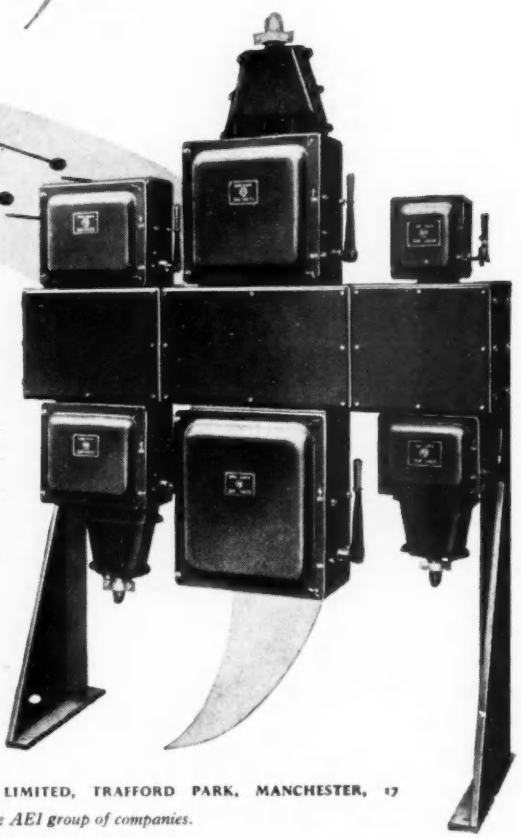
Right: Hackbridge single-phase, 10 kVA. pole mounting transformer.

HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD., WALTON-ON-THAMES, SURREY

Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames

- Available from stock
- Standard Unit Construction
- Easily Assembled
- 3 or 4-wire A.C. up to 660 volts

This means METROVICK Type MC fuse switchgear



Type MC Unit distribution boards are designed for controlling medium voltage power house and industrial systems. Their standard unit design means easy assembly with no drilling on site, and their sound engineering construction means a long trouble-free life. Full technical details and prices available on request.

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, TRAFFORD PARK, MANCHESTER, 17

Member of the AEI group of companies.

METROVICK *for all the Best in Switchgear*

F/V005

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 35s. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

BOROUGH OF DAGENHAM

STREET LIGHTING—MAJOR ROADS CONVERSION

THE Council invite tenders for the supply, delivery and erection of 217 Group A Lighting Units in Valence Avenue, Rainham Road, Whalebone Lane North and Parsloes Avenue. Plans may be seen, and specification and installation requirements together with form of tender obtained, on application to the Borough Engineer and Surveyor.

Tenders in the official envelope provided, which must bear no mark or indication of the sender and endorsed "Street Lighting—Major Roads Conversion—Stage III," must be delivered to the undersigned by February 24, 1951.

KEITH LAUDER,
Town Clerk.

Civic Centre,
Dagenham. (H 584)

THURROCK URBAN DISTRICT COUNCIL

INSTALLATION OF REFRIGERATORS IN COUNCIL HOUSES

TENDERS are invited for the installation of approximately 1,559 refrigerators in existing Council Houses on the Council's various estates. Refrigerators are to be of 1¼ cubic feet capacity and of the heat absorption type. Approximately 1,395 will be operated by electricity and approximately 164 by gas. Tenderers are asked to state the time estimated to be required for the supply and installation and to submit details of the refrigerator they propose to supply.

Further details can be obtained from the undersigned, together with forms of tender, upon payment of a deposit of £3 3s., which will be refunded upon receipt of a bona-fide tender delivered by February 27, 1951.

The Council do not bind themselves to accept lowest or any Tender.

A. E. POOLE,
Clerk of the Council.

Council Offices,
Whitehall Lane, Grays, Essex.
January 31, 1951. (H 583)

COUNTY BOROUGH OF SWANSEA

44 FLATS AT NEW STREET
TENDERS FOR ELECTRICAL INSTALLATION

ELECTRICAL engineers wishing to tender for the Electrical Installation for 44 Flats at New Street are invited to submit their applications to the Borough Architect, Guildhall, Swansea, on or before February 24, 1951.

Plans, specification and conditions of contract will be forwarded on application and deposit of £2 provided applicant gives satisfactory evidence of having previously carried out work of a similar character.

The deposit will be refunded after delivery of a bona fide tender (which is not subsequently withdrawn) and the return of all documents.

No guarantee is given that the lowest or any other tender will be accepted.

T. B. BOWEN,
Town Clerk.

Guildhall, Swansea.
January 30, 1951. (H 562)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

Southern Division

RE-ADVERTISED VACANCY

APPLICATIONS are invited for the position of STATION SUPERINTENDENT at Cowes Generating Station, Isle of Wight.

This station, of a present installed capacity of 13 MW (M.C.R.—11·3 MW), is being rebuilt as a permanent station with an anticipated installed capacity of at least 50 MW. The programme of extensions provides for two units of 12.5 MW each for commissioning in 1955/56.

A modern house with garage will be made available to the successful applicant.

The position is considered valuable training for more senior appointments, and candidates should have had experience of all aspects of the work of a generating station.

Preference will be given to applicants in possession of technical qualifications admitting to corporate membership of a recognised professional institution, and manufacturing works experience will be an advantage.

The terms and conditions of service will be those approved by the National Joint Board and the salary will be in accordance with Class "C," Grade 1, namely £857 rising to £875 per annum.

Forms of application may be obtained from the undersigned and must be completed and returned by February 14, 1951.

Candidates who replied to the previous advertisement need not re-apply as their applications will be considered in conjunction with those now submitted.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth. (H 557)

SOUTH EASTERN ELECTRICITY BOARD

Hastings District

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER

SALARY of £627 p.a. under N.J.B. Schedule, Class "E," Grade 6. Superannuation will be arranged. Applicants should be chartered electrical engineers or equivalent and be experienced in commercial, domestic, and farm installations and the repair and maintenance of electrical apparatus; also in the preparation of estimates.

Application forms obtainable from J. Savage, A.M.I.E.E., Hastings Manager, South Eastern Electricity Board, 12-13 York Buildings, Hastings, to be returned by February 24, 1951.

Kent Sub-Area, Rochester

ASSISTANT CONSTRUCTIONAL ENGINEER

Salary of £609 p.a. under N.J.B. Schedule, Class "J," Grade 10. Superannuation will be arranged. Applicants should be qualified, preferably corporate members of the I.E.E., with a sound engineering training, and responsible experience in the construction and operation of extensive urban and rural distribution systems, both overhead and underground, including sub-stations up to 33 kV. A considerable knowledge of overhead line construction and field supervision is essential. Duties involve standby.

Applications, giving two referees, must reach H. F. Knell, J.P., M.I.E.E., Kent Manager, South Eastern Electricity Board, 178 High Street, Rochester, Kent, by February 19, 1951.

A. L. BURNELL,
Secretary.

February, 1951. (H 568)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

SECOND ASSISTANT ENGINEER

APPLICATIONS are invited from qualified engineers for an appointment as Second Assistant Engineer in the Generation (Operation) Department.

The selected candidate will be required to assist the Generation Engineer in the control and operation of a group of power stations based on Nottingham.

Applicants should have served an engineering apprenticeship and should have an extensive experience in all phases of operation and maintenance of modern high pressure generating plant.

Salary will be within Grade 2 of Schedule C of the National Joint Board Agreement (£752-£966 per annum). The position is superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned not later than February 19, 1951.

W. S. BURGE,
Divisional Controller.

British Electricity House,
Barker Gate, Nottingham. (H 501)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of CHEMIST at Swindon Generating Station, Moredon, Swindon.

Applicants should preferably be qualified analytical chemists (or with Higher National Certificate), with knowledge of the sampling and analysis of fuels, oil testing and water treatment in connection with boilers.

Experience in the operation and maintenance of boilerhouse instruments and associated technical work will be an advantage. The station is scheduled for extension and the position offers scope to a young man with generating station laboratory training wishing to enlarge his experience.

The salary, which is provisional, will be in accordance with Class "E," Grade 7, £579-£609 per annum.

Forms of application may be obtained from the Divisional Secretary and should be returned to the address given below not later than Friday, February 16, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street, Portsmouth. (H 558)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of SENIOR CLERICAL ASSISTANT on the staff of the Generation Engineer (Construction) at Divisional Headquarters.

Applicants should have had experience of the organisation of a large office dealing with correspondence, filing records and general office routine. Experience with a large engineering organisation or consultants, and a knowledge of plan filing and progressing systems will be an advantage. Preference will be given to candidates who have held a position as Personal Assistant to a Senior Executive.

The conditions of service will be those approved by the National Joint Council and the salary will be in accordance with Grade 4, namely £510 to £570 per annum.

The post is superannuable in accordance with the Authority's scheme and a medical examination may be required.

Forms of application can be obtained from the undersigned and should be returned to the address given below not later than February 23, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
111 High Street,
Portsmouth. (H 590)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

(*a*) JUNIOR ENGINEER (TECHNICAL, (*b*) ASSISTANT ENGINEER (MAINTENANCE) at Croydon 'A' Power Station. Higher National Certificate Standard preferable. N.J.B. conditions of service.

(*a*) Successful applicant will assist Efficiency Engineer in plant investigation, testing and electrical records. Salary between Class "F," Grades 15, £400 and 14, £417 p.a.

(*b*) Practical experience of power station layout, operation and mechanical maintenance essential. Salary Class "F," Grade 10, £535 10s. p.a.

Both salaries inclusive of London allowance.

Applications, on forms obtainable from Divisional Secretary, British Electricity Authority, S.E. Division, Lower Ham Road, Kingston-upon-Thames, to be returned by February 17, 1951. (H 576)

KENT COUNTY COUNCIL

APPLICATIONS are invited for the following appointments in the Buildings Department:—

(1) SENIOR ENGINEERING ASSISTANT (Electrical) at a salary in A.P.T. Grade VI (£595-£660).

(2) ENGINEERING ASSISTANT (Electrical) at a salary in A.P.T. Grade V (£520-£570).

Candidates must be capable draughtsmen with at least five years' experience in the preparation of schemes, specifications and estimates for all classes of electrical installation work. The duties will include the preparation of drawings, inspection of premises and supervision of installations.

Applicants for (1) must be Corporate Members, and for (2) Graduate Members, of the Institution of Electrical Engineers.

The posts are superannuable and the successful candidates will be required to undergo a medical examination.

Applications, on forms obtainable from the County Architect, Springfield, Maidstone, must be delivered to him within fourteen days of the appearance of this advertisement.

W. L. PLATTS,
Clerk of the County Council.

County Hall, Maidstone.
January 30, 1951. (H 574)

BOROUGH OF RAMSGATE

APPOINTMENT OF WORKING ELECTRICAL FOREMAN

APPLICATIONS are invited for the appointment of a Working Electrical Foreman at a salary of £465 per annum.

Applicants should be experienced in electrical engineering, in the provision and maintenance of outdoor decorative lighting and possess a knowledge of mechanical construction. The person appointed will act under the direction of the Borough Engineer.

The appointment is subject to a medical examination and to the provisions of the Local Government Superannuation Act, 1937.

Housing accommodation will be provided, if necessary, at a reasonable rent.

Applications, stating age, experience and qualifications (if any), together with the names of two persons to whom reference may be made, must be received by the undersigned by not later than February 20, 1951, and should be endorsed "Electrical Foreman."

Canvassing will disqualify. Applicants must disclose in their application whether to their knowledge they are related to any member of, or the holder of any senior office under, the Council.

K. F. SPEAKMAN,
Town Clerk.

Municipal Buildings.
February 2, 1951. (H 586)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of SECOND ASSISTANT in the Commercial Department of the Western Sub-Area of the Board based on Tenby.

Applicants must have had an engineering training and also had experience in advising consumers on all aspects of the application of electricity to agriculture and horticulture. Preference will be given to applicants who possess the Higher National Certificate in Electrical Engineering or its equivalent.

The salary for the position will be in accordance with Class "G", Grade 7 (£651/£665/£679) of the National Joint Board Schedule for the electricity supply industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than February 20, 1951.

D. G. DODDS,
Secretary.
(H 597)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of an ASSISTANT ENGINEER (mains—overhead lines) in District 226 (Llanelly) in the West Central Sub-Area of the Board.

Preference will be given to applicants who possess the Higher National Certificate or its equivalent, or have passed the graduateship examinations of the Institution of Electrical Engineers.

The salary for the position will be in accordance with Class "E," Grade 10 (£488/£495/£502) of the National Joint Board Schedule for the electricity supply industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than February 17, 1951.

D. G. DODDS,
Secretary.
(H 596)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointment :—

No. 6 (Hull) Sub-Area

GENERAL ASSISTANT ENGINEER (Bridlington district) (Vacancy No. 2/51).

Applicants should have had experience in the operation and construction of 11 kV and l.t. overhead lines including pole mounted substations for rural electrification. They should also be competent to carry out overhead line surveys, preparation of route plans, supervision of linesmen and erection of overhead lines. Knowledge of underground networks will be an advantage.

Preference will be given to Corporate Members of the Institution of Electrical Engineers, or holders of the Higher National Certificate.

The successful candidate will be required to reside in Driffield and carry out standby duties.

Salary: N.J.B. Schedule Class "D," Grade 11, £436-£452 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, within fourteen days of the appearance of this advertisement. (H 573)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the appointment of GENERAL ASSISTANT ENGINEER (Physicist) in the Generation (Operations) Department of this Divisional Headquarters, at a salary in accordance with the revised National Joint Board Agreement AX/CX, Grade 8 (£437-£604 per annum).

Applicants should have had training up to a physics degree standard, but consideration will be given to applicants with the Higher National Certificate in Physics and Chemistry, or an equivalent qualification in Fue Technology.

Applicants should also have had experience in microscopical work, and participation in atmospheric pollution surveys would be an added advantage.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Scheme.

Forms of application may be obtained from the Divisional Secretary's Office at the address below, to whom completed applications should be returned not later than February 14, 1951, in a sealed envelope endorsed "General Assistant Engineer."

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport,
Cardiff.
January 29, 1951. (H 561)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of THIRD ASSISTANT in the Commercial Department of the West Central Sub-Area of the Board based on Swansea.

Applicants must have had a wide experience in designing and quoting for all classes of installation work, including large industrial installations.

The salary for the position will be in accordance with Class "K," Grade 10 (£646 to £660 to £674), of the National Joint Board Schedule for the Electricity Supply Industry.

Applications, stating age, present position, present salary qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than February 20, 1951.

D. G. DODDS,
Secretary.
(H 599)

SNOWY MOUNTAINS HYDRO-ELECTRIC AUTHORITY OF AUSTRALIA

INVITES applications for TRANSMISSION LINESMEN (single men only) for work in Australia. Applicants should be experienced in high-tension transmission line construction and maintenance for voltages of 66 kV and higher. Men selected will be paid trade union rate of £9 15s. (Aust.) per week of 40 hours. Ample opportunity for overtime. A camp allowance of £1 15s. (Aust.) per week will be made and linesmen will be accommodated in single cubicle rooms in barracks, free of charge, and will be required to pay the cost of their food, etc. Passages to Australia will be under Commonwealth Government's Assisted Passage Scheme in accordance with which men will contribute £10 stg. towards the cost of the passage.

Applications in writing, stating qualifications, experience in chronological order, age, nationality, present position, and rate of pay, should be addressed to Snowy Mountains Hydro-Electric Authority, 1-3 Regent Street, London S.W.1. (H 602)

BRITISH ELECTRICITY AUTHORITY

South Western Division

DEPUTY STATION SUPERINTENDENT
FEEDER ROAD POWER STATION

APPLICATIONS are invited for appointment as Deputy Station Superintendent at Feeder Road Power Station, Class "E," Grade 3, £775 to £909 per annum.

The successful applicant will be responsible to the Station Superintendent for the efficient operation and maintenance of the station, and will be required to deputise for him in his absence. Applicants should have wide power station operation, maintenance, and administrative experience.

Salary and conditions of service will be in accordance with the National Joint Board Agreement.

The appointment will be superannuable under the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Clifton, Bristol 8, so as to be received not later than February 17, 1951.

R. C. BARRETT,
Divisional Secretary.
February 1, 1951. (H 571)

BRITISH ELECTRICITY AUTHORITY

South Western Division

MAINTENANCE ENGINEER (ELECTRICAL)
PORTISHEAD POWER STATION

APPLICATIONS are invited for the position of Maintenance Engineer (Electrical), at Portishead Power Station, Class "J," Grade 6, £799 to £833 per annum.

Applicants should be qualified electrical engineers and have had workshop training with wide general experience of Power Station electrical equipment and practical experience of e.h.t. switchgear and protective gear.

Preference will be given to applicants who are Corporate Members of the Institution of Electrical Engineers or who possess equivalent qualifications.

Salary and conditions of service will be in accordance with the National Joint Board Agreement.

The appointment will be subject to superannuation under the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Clifton, Bristol 8, so as to be received not later than February 17, 1951.

R. C. BARRETT,
Divisional Secretary.
February 1, 1951. (H 570)

LONDON ELECTRICITY BOARD

DEMONSTRATOR (FEMALE)

APPLICATIONS are invited for the above position in the Hammersmith District of the Western Sub-Area.

Applicants should be suitably qualified, holding the E.A.W. or other approved certificate, including electrical housecraft, and have experience in conducting demonstrations at the service centre and in general service centre duties. They should also be experienced in advising consumers on the selection and use of domestic appliances, both at the service centre and on consumers' premises.

The post is graded within the permanent agreement of the National Joint Council (Administrative and Clerical Grades) as Grade 1, i.e. £325 to £420 per annum, inclusive of London area allowance.

Application forms, obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned within seven days. Please enclose addressed foolscap envelope, and quote reference EST/V/1123/T on envelope and all correspondence. (H 593)

LONDON ELECTRICITY BOARD

DRAUGHTSMEN

APPLICATIONS are invited for positions as Draughtsmen in the Design and Planning Branch of the Western Sub-Area.

Applicants should have had a technical education to National Certificate standard, drawing office training, and considerable experience in the layout of h.v. and l.v. mains and general mains records.

Pending grading of the posts under the national agreement of the appropriate negotiating body, the commencing salaries will be within the range of £300 to £500 per annum inclusive, according to qualifications and experience.

Application forms, obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned duly completed within seven days. Please enclose addressed foolscap envelope and quote reference EST/V/1158/T on envelope and all correspondence. (H 594)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

Aldershot District of No. 3 (Portsmouth) Sub-Area

ASSISTANT DISTRICT COMMERCIAL OFFICER (FIRST ASSISTANT)

Salary, N.J.B., Class "F," Grade 6 (£660 to £676 to £692 per annum). N.J.B. Conditions of Service.

Applicants should have sound knowledge of rural development and must possess comprehensive knowledge of estimating for all types of electrical installations. They must be fully conversant with all aspects of the commercial side of the industry.

Candidates who have already submitted applications need not do so again.

Basingstoke District of No. 3 (Portsmouth) Sub-Area

ASSISTANT ENGINEER

Provisional salary, £375 per annum, subject to adjustment by the appropriate negotiating machinery. Conditions of service as prescribed from time to time.

Applicants should have experience in the design, construction, operation, and maintenance of h.v. and l.v. overhead and underground distribution systems, substation plant and distribution equipment and should possess suitable technical qualifications. The appointment will involve stand-by duties.

No. 3 (Portsmouth) Sub-Area

SENIOR OPERATOR (FEMALE) PUNCHED CARD MACHINES

Salary within the range of £310 to £390 per annum, according to ability and experience in accordance with N.J.C., Grade 1.

Applicants should have experience in the operation of Powers Samas accounting machines and ability to supervise female operators and to organise their work.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

Applications, on forms to be obtained from the Sub-Area Secretary, No. 3 Sub-Area, Lower Drayton Lane, Cosham, Portsmouth, and returned to him not later than 14 days after the appearance of this notice, with the envelopes endorsed with the title of the post applied for.

F. W. KEMPTON,
Secretary.
(H 587)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

THIRD ASSISTANT ENGINEER

APPLICATIONS are invited for the position of Third Assistant Engineer in the Transmission Department at this Divisional Headquarters.

Applicants should have had previous experience in setting out, construction, inspection and checking of overhead e.h.t. lines in the field and in the preparation of profiles. Corporate or graduate membership of the I.E.E. or equivalent qualifications will be considered an advantage.

The salary for this appointment will be in accordance with Class "AX/DX," Grade 5 of Schedule C of the National Joint Board Agreement (£579 to £776 per annum).

The appointment will be superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned not later than February 19, 1951

W. S. BURGE,
Divisional Controller.

British Electricity Authority,
British Electricity House,
Nottingham. (H 520)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of GENERAL ASSISTANT ENGINEER in the Engineering Department of the Western Sub-Area of the Board based on Tenby.

Applicants should have had a sound engineering training, and in particular, should be experienced in the survey, lay-out, construction and maintenance of overhead lines.

The salary for the position will be in accordance with Class "G," Grade 13 (£433/£441/£449) of the National Joint Board Schedule for the electricity supply industry.

Applications, stating age, qualifications and experience, present position, present salary and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than February 17, 1951.

D. G. DODDS,
Secretary.
(H 595)

BRITISH ELECTRICITY AUTHORITY

North-Western Division

APPLICATIONS are invited for the following positions as SHIFT CHARGE ENGINEERS:

Vacancy No.

359 Greenhill Generating Station.
Salary range £579/£609 per annum, Grade 7 Class "E."

360 Burnley Generating Station.
Salary range £531/£553 per annum, Grade 7, Class "C."

361 Ribble Generating Station.
Salary range £692/£722 per annum, Grade 7, Class "H."

Candidates for these positions should preferably possess technical qualifications and previous experience in a generating station is essential.

362 SECTION ENGINEER.

Applications are also invited for the position of SECTION ENGINEER IN THE TRANSMISSION DEPARTMENT. Salary range £684/£890 per annum, Grade 4, Class "AX/DX."

Candidates should have had sound experience in H.V. Transmission and should preferably possess a recognised degree in Electrical Engineering or equivalent qualifications.

All these positions are superannuable and the salaries are in accordance with the revised National Joint Board Agreement.

Applications, quoting the vacancy number, stating age, qualifications and present position, and giving full details of education and experience, should be received by The Establishment Officer, British Electricity Authority, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than February 17, 1951. (H 572)

CITY OF MANCHESTER

City Architect's Department

APPLICATIONS are invited for the following permanent appointments :—

(1) ELECTRICAL ENGINEERING ASSISTANT
Salary A.P.T. III, £450 to £495 per annum.

Candidates must be capable of preparing schemes for electric lighting and power installations in all types of municipal buildings and should have passed the intermediate examination of the Institute of Electrical Engineers or its equivalent.

(2) JUNIOR ELECTRICAL ENGINEERING ASSISTANT
Salary, General Division Grade, £135 to £385 per annum, according to age.

Candidates must be training in the application of electricity to all forms of public buildings and should have obtained the Ordinary National Certificate in electrical engineering.

The salary and conditions of service for both of the appointments will be in accordance with the National Scheme of Service Conditions.

Forms of application may be obtained from and should be returned, together with not more than three recent testimonials, to Leonard C. Howitt, B.Arch., F.R.I.B.A., City Architect, Town Hall, Manchester 2, by 24th February 1951, endorsed for the appropriate appointment. Canvassing is prohibited.

PHILIP B. DINGLE,
Town Clerk.

Town Hall, Manchester 2.
February, 1951. (H 607)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of THIRD ASSISTANT ENGINEER in the Chief Engineer's Department of the Board at St. Mellons, Cardiff.

Applicants should have had a sound engineering training, have a good knowledge of distribution practice, and should also have had experience in one or more of the following branches of work:—

(1) Collection, tabulation and analysis of technical data relating to Distribution Systems.
(2) Preparation of reports on Load Development.
(3) Network calculation for the assessment of load flows and system fault levels.

The salary for the position will be in accordance with Class "AX," Grade 5 of the National Joint Board Schedule (£579 to £710), and thence, on present classification to Class "CX" (£738 to £753).

Applications, stating age, qualifications and experience, present position, present salary and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), The South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him not later than February 20, 1951.

D. G. DODDS,
Secretary.
(H 600)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the following permanent appointments in the Generation (Construction) Department of this Divisional Headquarters at salaries in accordance with the revised National Joint Board Agreement:—

(a) SECOND ASSISTANT ENGINEER (Quantity Surveyor), Class "AX/CX," Grade 2 (£752 to £938 per annum).

(b) THIRD ASSISTANT ENGINEER (Site Plant Erection Supervisor) (Electrical), Class "AX/CX," Grade 5 (£579 to £753 per annum), at the commencing salary of £710 per annum.

(c) THIRD ASSISTANT ENGINEER (Site Plant Erection Supervisor) (Mechanical), Class "AX/CX," Grade 5 (£579 to £753 per annum) at the commencing salary of £710 per annum.

The successful applicants will for a period of two/three years be stationed at the Uskmouth Generating Station Site, near Newport.

Applicants for (a) should be qualified Quantity Surveyors, capable of dealing with measurements of large contracts by standard methods, preparation of Bills of Quantities, etc.

Applicants for (b) and (c) should preferably have obtained the Higher National Certificate or its equivalent, received manufacturer's works training, and had experience in the erection of power-station plant and ancillary electrical or mechanical equipment.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards' Scheme.

Forms of application may be obtained from the Divisional Secretary's Office at the address below, to whom completed applications should be returned not later than February 26, 1951, in a sealed envelope endorsed with the appointment sought.

H. V. PUGH,
Divisional Controller.

Cardiff (Pengam Moors) Airport,
Cardiff.
February 2, 1951. (H 589)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment in the Generation Construction Department at Divisional Headquarters:—

GRADE I DRAUGHTSMAN (MECHANICAL)

The commencing salary will be within the range of £519 to £636 per annum which includes London Weighting.

Applicants should be in possession of the Higher National Certificate or equivalent and preferably have served a recognised apprenticeship course. They should be familiar with one or more of the following:—

Generating station layout and design, coal handling plant, Ash and Dust handling system and Pipework systems.

The salary is provisional and will be subject to negotiation through the medium of the appropriate negotiating body.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent in envelopes endorsed "Grade I Draughtsman (Mechanical)," to arrive not later than February 16, 1951 to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14.

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (H 532)

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of THIRD ASSISTANT in the Commercial Department of the Western Sub-Area of the Board based on Tenby.

Applicants must have had an engineering training and preference will be given to those who possess the Higher National Certificate in Electrical Engineering or its equivalent. They must have had some experience in the development of industrial loads.

The successful applicant will assist the Sub-Area Low Voltage First Assistant generally, but particularly in relation to the development of industrial load.

The salary for the position will be in accordance with Class "G," Grade 10 (£539 to £550 to £561), of the National Joint Board Schedule for the Electricity Supply Industry.

Applications, stating age, present position, present salary, qualifications and experience, and whether married or single, together with the names and addresses of three referees, should be addressed to the Secretary (Establishments Section), St. Mellons, Cardiff, so as to reach him not later than February 20, 1951.

D. G. DODDS,
Secretary.
(H 598)

LONDON ELECTRICITY BOARD

DRAUGHTSMEN

APPLICATIONS are invited for vacancies as Draughtsmen:—

Reference No. EST/V/1151/T—Southern Sub-Area. Experience in records in connection with the laying of underground cables preferable.

Reference No. EST/V/1152/T—South-Western Sub-Area (Battersea, Balham and Wimbledon). Applicants should have experience in the following in relation to distribution systems up to 11 kV: plant and cable layout work; diagrams; cable surveys and wayleaves.

Reference No. EST/V/1155/T—Northern Sub-Area (Aldersgate Street, E.C.1), Design and Planning Branch. Applicants should be capable of making drawings of plant, cable layouts, line diagrams of steel or concrete structures from rough sketches supplied, or from draughtsman's own measurements. Previous experience in the electricity supply industry an advantage, but not essential.

Candidates for all the foregoing vacancies should have had a good general and technical education, also drawing office experience. The commencing salaries, which are provisional, pending agreement with the appropriate negotiating organisations, will be in accordance with qualifications and experience, and will be between £300 and £450 per annum.

Application forms obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned duly completed within seven days. Please enclose addressed foolscap envelope and quote appropriate reference number shown above, on envelope and all correspondence. (H 556)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointments at the Peterborough Generating Station:—

STATION SHIFT CONTROL ENGINEERS
BOILER SHIFT CONTROL ENGINEERS

The salary for these appointments will be in accordance with the revised N.J.B. Schedule, Grade 10, Class "D," (£465-£481 per annum); shortly rising to Grade 10, Class "F," (£510-£530 per annum).

The salary is, however, provisional and is subject to ratification by the National Joint Board.

Applicants should have reached the standard of the Ordinary National Certificate in Electrical Engineering, or its equivalent, and had experience in the operation of a switchboard at a generating station and be fully conversant with high-tension switching operation and protective systems. Experience in the operation of pulverised fuel-fired steam-raising plant will be an advantage.

The successful applicants will be required to interchange the duties of Station Shift Control Engineer and Boiler Shift Control Engineer.

The appointments will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority Eastern Division, Northmet House, Southgate, N.14, to arrive not later than February 16, 1951. Envelopes should be endorsed with the appointment sought.

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (H 519)

SINGAPORE MUNICIPALITY

Electricity Department

CHARGE ENGINEERS, Permanent Staff, required for shift duties in the Singapore power station. Present capacity 37,000 kW with proposed extensions to 87,000 kW.

Experience of extra high tension 3-phase generation in a modern high pressure steam power station required. Appointment subject to medical examination.

Basic salary scale $440 to $870 per month. Starting point according to qualifications and experience. Graduated scale of allowances, e.g. present allowances on $590 p.m. basic salary amount to: expatriation $110 p.m. plus cost of living $198 p.m. for single man or $256.50 p.m. for married man or $334.50 p.m. for married man with family. One Straits dollar equals 2s. 4d. Thus a married man with family on basic salary of $590 would draw equivalent of £1,448 sterling per annum.

Quarters with heavy furniture provided at 8 per cent. of salary or housing allowance in lieu. Initial engagement on three years' agreement. Eight months leave after four years service. Free medical attention. Passages paid including family (children under 17). Compulsory provident fund contribution 7½ per cent. of salary and municipal commissioners donate 7½ per cent. for first 10 years rising to 20 per cent. after 20 years' service.

Applications, in duplicate, with full personal and technical information and copies of three testimonials to Messrs. Peirce and Williams (Agents to the Municipal Commissioners), 1 Victoria Street, London S.W.1.

(H 430)

NORTH WESTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Area Board Headquarters

SENIOR CIVIL ENGINEERING DRAUGHTSMAN

Applicants should have had a sound technical training and practical experience in the design of industrial buildings, reinforced concrete, structural steelwork and surveying, and be capable of preparing complete working drawings for the above. Experience in the design of electrical sub-station buildings would be an advantage.

The salary, which is provisional and subject to negotiation with the appropriate body, will be within the range of £500-£600 per annum. The post is superannuable.

Applications, stating age, education, qualifications and experience, present post and salary, should be received by the Establishment Officer, The North Western Electricity Board, Cheetwood Road, Manchester 8, not later than Saturday, February 17, 1951.

No. 3 Sub-Area

SENIOR HOUSECRAFT ADVISER

Candidates must be capable of undertaking the control and training of demonstrating staff and the organisation of demonstrations, and the successful candidate will be required to co-operate with the appropriate officers on the planning of exhibitions and displays at agricultural shows, etc., and to maintain contact with the local educational authorities and women's organisations. The duties include carrying out those of a district demonstrator in case of need.

Preference will be given to applicants who have satisfactorily held the position of a Senior Demonstrator in the electrical industry and are the holders of the E.A.W. Diploma.

The salary for the post, which is superannuable, will be in accordance with Grade 3 of the National Joint Council (Administrative and Clerical Grades) for the Electricity Supply Industry, i.e. £450 per annum rising by annual increments of £20 to £510 per annum.

Applications, stating age, training, qualifications, experience, present post and salary, should be received by E. Binns, Esq., M.I.Mech.E., A.M.I.E.E., Sub-Area Manager, The North Western Electricity Board, No. 3 Sub-Area Headquarters, Union Street, Oldham, not later than Saturday, February 17, 1951.

No. 3 Sub-Area

LINESMAN (OVERHEAD POWER)

The terms and conditions of employment will be in accordance with those laid down by the National Joint Industrial Council for the Electricity Supply Industry, the present rate of pay being 35·5d. per hour for a 44-hour week.

Applicants should be experienced in the erection and maintenance of medium- and high-voltage overhead lines.

Applications stating age, experience and qualifications, present post and rate of pay, should be received by E. Binns, Esq., M.I.Mech.E., A.M.I.E.E., Sub-Area Manager, The North Western Electricity Board, No. 3 Sub-Area Headquarters, Union Street, Oldham, not later than Saturday, February 24, 1951.

No. 3 Sub-Area

GENERAL ASSISTANT ENGINEER (OPERATION AND MAINTENANCE)

The salary for the post will be in accordance with Class "J," Grade 13, of the Revised National Joint Board Agreement, i.e. £486 £496 £506 per annum.

Applicants should have a knowledge of the operation and maintenance of large industrial and rural high-voltage and low-voltage networks, including both overhead lines and underground cables.

Graduate membership of the Institution of Electrical Engineers or exempting qualifications will be an advantage.

Applications, stating age, education, qualifications and experience, present post and salary, should be received by E. Binns, Esq., M.I.Mech.E., A.M.I.E.E., Sub-Area Manager, The North Western Electricity Board, No. 3 Sub-Area Headquarters, Union Street, Oldham, not later than Saturday, February 24, 1951.

No. 4 Sub-Area

LINESMEN (OVERHEAD POWER) AND LINESMEN'S (OVERHEAD POWER) MATES

Applications are invited for posts of Linesmen (Overhead Power) and Linesmen's (Overhead Power) Mates in all districts of the No. 4 Sub-Area, based on Preston, Lancaster, Fleetwood or Lytham St. Annes.

Applicants should have had experience in the erection and maintenance of high- and medium-voltage wood-pole lines; experience of working on lattice towers will be an advantage.

Wages and conditions of service will be in accordance with the agreement of the National Joint Industrial Council for the Electricity Supply Industry, the present rates being as under:—

LINESMAN (OVERHEAD POWER): 35·50d. per hour, equivalent to £6/10/2 for a 44-hour week.

(*Continued in next column*)

(*Continued from previous column*)

LINESMAN'S (OVERHEAD POWER) MATE: 31·00d. per hour, equivalent to £5/13/8 for a 44-hour week.

Applications, stating age, qualifications, training and experience, should be received by the Sub-Area Manager, No. 4 Sub-Area, The North Western Electricity Board, 40/41 Lune Street, Preston, not later than Saturday, February 17, 1951.

Burnley—No. 5 Sub-Area

DISTRICT ENGINEER

Candidates should have had a sound training in electrical engineering and considerable experience in the operation and maintenance of high- and low-voltage networks (overhead and underground) and sub-stations, the supervision of constructional work, and the keeping of essential records of mains and sub-station equipment and layouts. The successful applicant will be responsible for the general maintenance of supply in the district.

The salary will be in accordance with the revised schedule of the National Joint Board, Class "F," Grade 2, i.e. £916-£937-£958 per annum. The post is superannuable.

Corporate membership of the Institution of Electrical Engineers will be an advantage.

Applications, stating age, education, qualifications and experience, present post and salary, should be received by R. H. Harral, Esq., M.I.E.E., M.Inst.F., Sub-Area Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee Street, Blackburn, not later than Saturday, February 17, 1951. (H 559)

SINGAPORE MUNICIPALITY

ASSISTANT DISTRICT ENGINEERS, Electricity Department, required for permanent staff. Qualifications: Graduate I.E.E. and experience electricity distribution.

Basic salary scale $440-$870 per month. Starting point according to qualifications and experience. Graduated scale of allowances, e.g., present allowances on $590 p.m. basic are: Expatriation $110 p.m. plus cost of living $198 p.m. for single man or $256·50 for married man or $334·50 for married man with family. One Malayan dollar equals 2s. 4d. Thus married man with family on basic salary of $590 p.m. would draw equivalent of £1,448 per annum.

Quarters with heavy furniture provided at 8% of salary or allowance in lieu. Initial appointment on three years agreement; 8 months leave after 4 years service. Free medical attention. Passages paid including family (children under 17). Compulsory provident fund contributions of 7½% of salary and Municipal Commissioners donate 7½% rising to 20% after 20 years service.

Applications in duplicate, with full personal and technical information and copies of three testimonials, to Messrs. Peirce & Williams (Agents to the Municipal Commissioners), 1 Victoria Street, London S.W.1, before Wednesday, February 28, 1951. (H 565)

TRINIDAD AND TOBAGO ELECTRICITY COMMISSION

SHIFT ENGINEER

APPLICATIONS are invited for the appointment of Shift Engineer at the Commission's Power Stations in Trinidad.

The Port of Spain Power Station consists of 12,500 kVA of Steam Turbo Alternators with Water Tube Boilers 425 p.s.i., 740° F. and 7,400 kVA of Diesel Generating Plant. The Penal Power Station will have an initial capacity of 10,000 kVA Steam Turbine plant, and the two stations will be inter-connected through a 66 kV transmission line.

Applicants must be not more than 40 years of age, and have served an apprenticeship in mechanical engineering or a pupilage in a Power Station and have had subsequent experience in the operation of steam turbine and water tube boilers, experience in the operation of Diesel Engines is desirable but not essential. Applicants must be capable of taking charge of a shift in any of the Commission's Power Stations after a short period in which to become familiar with the plant.

The salary of the appointment is in the scale $2880-$120-$3840-$240-$4080 per annum (£1=$4.80 B.W.I.) (equivalent to £600 p.a. increasing by £25 p.a. to £800 p.a. with one increment of £50 to £850 p.a.) subject to satisfactory service.

Furnished quarters at moderate rentals or a rent allowance in lieu are provided under the Commission's Regulations.

Free passages are provided for the officer and family, not exceeding four persons.

An outfit allowance of $288 (£60) will be granted on first appointment.

The appointment is subject to an agreement for three years in the first instance, and medical examination by the Commissioner's medical adviser.

Applications, endorsed "Shift Engineer, Trinidad," stating age, marital status, family, nationality, general and technical education, apprenticeship, appointments held, and full details of power station experience, with references, to be submitted to the undersigned within 21 days from the date of this advertisement.

PREECE, CARDEW & RIDER,
8 and 10 Queen Anne's Gate,
Westminster, S.W.1. (H 585)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Chilterns Sub-Area 14/51

DISTRICT SENIOR COMMERCIAL ASSISTANT (OPERATIONS)

Applications are invited from suitably qualified Engineers for an appointment as Senior Commercial Assistant. Candidates should have sound engineering training and preferably have obtained the Higher National Certificate in Electrical Engineering or its equivalent. They should be competent to advise consumers on all matters relating to electrical installations and tariffs and the sale and installation of apparatus. They should also have had considerable experience in estimating for electrical installations in factories, housing estates, domestic premises, farms and nurseries.

The provisional salary will be £610 per annum. Applications should be addressed to: The District Manager, Northwood District, Electricity Offices, 1 Love Lane, Pinner, so as to reach him within 14 days of the appearance of this advertisement.

Essex Sub-Area 13/51

SENIOR HOUSECRAFT ADVISER

Applications are invited for the appointment of a Senior Housecraft Adviser for the Essex Sub-Area. Applicants must have had a good general education and hold recognised qualifications in domestic science, including the E.A.W. diploma. They should be experienced in conducting lecture demonstrations both at Service Centres, Public Buildings and in consumers' homes, and be able to advise consumers in the choice and use of all domestic appliances. The person appointed must be competent to coordinate the work of Housecraft Advisers and Demonstrators within the Sub-Area; to contact Education Authorities, particularly with regard to the domestic electrical equipment in Domestic Science Centres, Technical Colleges, etc.; to maintain contact with Women's Organisations; to assist with the recruitment and training of staff, and the practical testing of appliances.

The salary will be in accordance with Grade 4 (salary range £510 to £570 per annum) of the N.J.C.'s salary agreement dated March 23, 1950. Applications should be addressed to the Sub-Area Manager, Essex Sub-Area, Eastern Electricity Board, "Millfield," Bentley, nr. Brentwood, Essex, so as to arrive within 14 days of the appearance of this advertisement.

Norfolk Sub-Area 15/51

ASSISTANT COMMERCIAL ENGINEER (GT. YARMOUTH/LOWESTOFT DISTRICT)

Applications are invited for the appointment of Assistant Commercial Engineer in the Lowestoft Branch of the Gt. Yarmouth/Lowestoft District.

Applicants should preferably hold National Certificates Ordinary and Higher) and should have had wide commercial and sales experience to take charge of the sales and commercial development within the Lowestoft Branch Area. A knowledge of estimating for all types of installations, and a sound knowledge of domestic apparatus, is essential.

The provisional annual salary will be £550. Applications should be addressed to: The District Manager, Eastern Electricity Board, Regent Road, Gt. Yarmouth, so as to arrive within 14 days of the appearance of this advertisement.

Northmet Sub-Area 16/51

ASSISTANT COMMERCIAL ENGINEER (ST. ALBANS, Ref. No. 276)

Applications are invited for the position of Assistant Commercial Engineer at St. Albans. Applicants should have technical training preferably to that of Higher National Certificate of Electrical Engineering, experience in commercial development including rates of supply, experience in hire and hire-purchase schemes, control of services centre sales and maintenance staff and be capable of the preparation of wiring specifications and the control of wiring staff.

The successful candidate will be responsible under the District Commercial Engineer for all commercial activities.

The provisional salary for the appointment will be £570 per annum. Applications should be made on form 1078 and returned to the District Manager, Eastern Electricity Board, Northmet Sub-Area, St. Peters Street, St. Albans, Herts, so as to arrive within 14 days of the appearance of this advertisement.

Future salaries and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme, and may be required to pass a medical examination.

Applications, in writing, stating age, qualifications experience, details of present employment and salary, together with the names of two referees, should be addressed to the Managers concerned. (H 592)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following positions at Blackwall Point Generating Station, River Way, Greenwich, which when completed will have a capacity of 90 MWs. Candidates for all positions should have received a sound technical and practical training and have additional qualifications as indicated below.

(a) DEPUTY STATION SUPERINTENDENT. Salary, revised N.J.B. Schedule, Class "F," Grade 3, plus London allowance, £868 7s. per annum.

Training in electrical and mechanical engineering, followed by a wide experience in the operation and maintenance of modern generating plant with pulverized fuel firing equipment.

The successful applicant will be responsible to the Station Superintendent for the efficient operation and maintenance of the station and will be required to deputise for him in his absence.

(b) MAINTENANCE ENGINEER (MECHANICAL). Salary, revised N.J.B. Schedule, Class "F," Grade 6, plus London allowance, £693 per annum.

Experience in the maintenance of modern generating plant, including the complete overhaul of high-pressure boilers and turbines and their associated equipment.

(c) FIVE SHIFT CHARGE ENGINEERS. Salary, revised N.J.B. Schedule, Class "F," Grade 7, plus London allowance, £656 5s. per annum.

Training in electrical and mechanical engineering and must have had at least three years' practical experience in the operation of modern high-pressure turbine and boiler plant, preferably with pulverized fuel firing equipment.

(d) FIVE ASSISTANT SHIFT CHARGE ENGINEERS. Salary, revised N.J.B. Schedule, Class "F," Grade 9, plus London allowance, £564 18s. per annum.

Experience in the operation of a modern generating station, preferably with pulverized fuel equipment.

(e) ASSISTANT MAINTENANCE ENGINEER (ELECTRICAL). Salary, revised N.J.B. Schedule, Class "F," Grade 9, plus London allowance, £564 18s. per annum. (Grading subject to approval of appropriate District Joint Board and confirmation by National Joint Board in accordance with Class 33 (2).)

Experience in the repair and maintenance of e.h.t. switchgear alternators, transformers, control gear, and associated electrical equipment.

(f) ASSISTANT MAINTENANCE ENGINEER (MECHANICAL). Salary, revised N.J.B. Schedule, Class "F," Grade 9, plus London allowance, £564 18s. per annum. (Grading subject to approval of appropriate District Joint Board and confirmation by National Joint Board in accordance with Clause 33 (2).)

Experience in the maintenance of modern generating plant.

(g) FIVE STATION SHIFT CONTROL ENGINEERS. Salary, revised N.J.B. Schedule, Class "F," Grade 10, plus London allowance, £535 10s. per annum.

Experience in the control and operation of generating plant and e.h.t. switchgear.

(h) SIX JUNIOR ENGINEERS for general duties in the station. Salary, revised N.J.B. Schedule, Class "F," Grade 14, plus London allowance, £417 per annum.

Preferably some experience in the control room of a modern generating station.

All the foregoing appointments will be superannuable under the terms of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster S.W.1, and should be received within fourteen days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(H 569)

SNOWY MOUNTAINS HYDRO-ELECTRIC AUTHORITY OF AUSTRALIA

INVITES applications for TRANSMISSION LINE WORKS FOREMAN OR SUPERVISOR. Salary range: Works Foreman, £594 to £684 p.a. (Aust.); Works Supervisor, £744 to £792 p.a. (Aust.).

Applicants should be experienced in high-tension transmission line construction and maintenance for voltages of 66 kV and higher.

All salaries are subject to cost-of-living adjustment. Passages to Australia will be under the Commonwealth Government's Assisted Passage Scheme, under which appointees contribute £10 stg. towards the cost of their passage.

Applications, in writing, stating qualifications, experience in chronological order, age, nationality, present position, and rate of pay, should be addressed to Snowy Mountains Hydro-Electric Authority, 1-3 Regent Street, London S.W.1. (H 601)

BRITISH ELECTRICITY AUTHORITY

Transmission Design Branch

CHIEF ENGINEER'S DEPARTMENT—LONDON

APPLICATIONS are invited for the following positions in the Transmission Design Branch at Headquarters in London: (*a*) SECOND ASSISTANT ENGINEER (Electricity Meters and Instruments), within Grade 3 of the N.J.B. Agreement, £755 to £1,017 p.a., rising to £1 120 p.a. including London Allowance; (*b*) THIRD ASSISTANT ENGINEER (Protective Gear), and (*c*) THIRD ASSISTANT ENGINEER (Overhead Lines), within Grade 4 of the N.J.B. Agreement £676 to £807 p.a., rising to £891 p.a. including London Allowance.

For position (*a*) candidates should be Corporate Members of the I.E.E. and should preferably hold a Degree in Electrical Engineering. They should have special experience in the design, application and operation of large bulk supply metering schemes and have good knowledge of the theory and practice of electrical measuring instruments of all types.

For position (*b*) candidates should have technical qualifications not less than those required for Associate Membership of the I.E.E. They should have good all-round experience in the theory and practical application of modern types of protective gear for large high voltage systems, good general knowledge of electrical plant characteristics and be accustomed to the preparation and interpretation of complex wiring diagrams.

For position (*c*) candidates should have educational qualifications not less than those required for Associate Membership of the Inst.C.E. or the I.E.E. They should have experience in the design, construction and maintenance of high voltage steel tower overhead lines. Familiarity with calculations in the detailed design of the steel towers themselves and the design of foundations in varying classes of ground would be an advantage.

The duties of all the above appointments will be to study new developments, to analyse and follow up the results of service experience and to advise on the application of new equipment and new methods to the Authority's high voltage transmission systems.

The starting salary for the appointments, which are superannuable, will be determined according to the qualifications and experience.

Application forms may be obtained from the Secretary's Office (Establishments), Applications Section, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, and should be completed and returned to D. Moffat, Director of Establishments, not later than February 26, 1951. The information on the Application Form may be supplemented on separate sheets if so desired.

Please quote Reference AE/131. (H 575)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for appointments in the Generation Engineer (Construction) Department at Divisional Headquarters, Portsmouth.

The duties to be performed will fall within the following categories:—

(a) CIVIL ENGINEERING: The work will include the construction of new generating stations and modifications of existing stations. Candidates should have had experience of similar projects.

(b) ELECTRICAL ENGINEERING: Applicants should have had manufacturing works' training and be experienced in either works and erection experience or the lay-out of large switchgear or cabling installations.

(c) MECHANICAL ENGINEERING: Manufacturing works' experience is desirable and applicants should have had experience in the mechanical aspects of power station design or construction.

(d) DRAUGHTSMEN: Applicants must have had a sound drawing-office and works' training, preferably with large manufacturers of power-station plant. Experience in the layout and construction of modern generating stations is also necessary.

Candidates should preferably be corporate members of a recognised professional institution, or hold equivalent qualifications.

Salaries will be within the ranges from £437 to £911 in accordance with ability, experience, qualifications and responsibility. Appointments under (a), (b) and (c) will be made in accordance with the appropriate grade under the N.J.B. Agreement. Those under (d) will be provisional and subject to negotiation.

All posts will be superannuable and may be subject to a satisfactory medical examination.

Applications for forms, stating for which category of appointment candidates wish to apply, should be addressed to the undersigned.

Completed forms should be returned to me by February 23, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street,
Portsmouth. (H 591)

CANADA
ONTARIO

Large electrical company requires EXPERIENCED CIVIL, ELECTRICAL and MECHANICAL ENGINEERS, DRAUGHTSMEN and TECHNICIANS. Excellent opportunities. Call, or write, stating experience:

Dept. B., Ontario Immigration, Ontario House, Charles II St., London S.W.1. (H 418p)

ARC AND GAS WELDER required. Must be first-class man with experience non-ferrous metals and brazing. Some experience of copper working and ability to undertake light constructional work an advantage.—Apply, Box No. 3051, Electrical Times. (H 577)

ASSISTANT ELECTRICAL DESIGNER required with good experience in the design of induction motors. The position offers good prospects, good working conditions with superannuation scheme. Assistance in regard to housing will, if necessary, be given.—Applications treated in strict confidence should state details of general and technical education, together with practical design experience, to Ref. WN, Crompton Parkinson Ltd., Guiseley, Nr. Leeds. (H 417)

CABLE CONTRACTS ENGINEER required to handle large projects for installation, laying and jointing of cables up to highest voltages. Applicants must be capable of estimating and supervising excavations and measured work and of controlling labour. Excellent opportunity of advancement for successful candidate.—Applications to Box No. 3033, Electrical Times. (H 525)

DRAUGHTSMEN. Britain's leading design consultants and contractors require urgently Senior Switchgear Draughtsmen, also Juniors to train as Switchgear Draughtsmen. Good salaries and prospects of advancement for suitable applicants. Pension scheme.—Write in confidence, quoting reference E.T., to John A. Smith Ltd., 24 Lichfield Street, Wolverhampton. (H 335)

DRAUGHTSMEN AND ENGINEER DESIGNERS required, preferably with experience in any branch of high tension and low tension electrical switchgear or electrical control gear, also applications from good mechanical draughtsmen and designers are invited.—Apply, quoting "Switchgear," to Staff Manager, General Electric Co., Ltd., Witton, Birmingham 6. (H 442)

DRAUGHTSMEN with experience of switchgear and or rectifier design required by Hackbridge and Hewittic Electric Co. Ltd., Walton-on-Thames. Pension scheme. Five-day week.—Write, giving past experience, technical education and salary required, to Chief Mechanical Engineer. (H 482)

DRAUGHTSMEN with experience on all sizes of power transformers required by company in S.W. London. Pension scheme in operation and five-day week. State full details, past experience, technical education and salary required.—Box No. 3019, Electrical Times. (H 480)

ELECTRICAL ENGINEER, aged 25 to 30, with some D.O. and industrial experience required for progressive position in Electrical Design Department. Work will comprise layout of wiring and control gear of small automatic machines and design of auxiliary equipment.—Write, full particulars, Box No. 7779, c/o White's Ltd., 72 Fleet Street, London E.C.4. (H 606)

ELECTRICAL ENGINEER to take charge of operation and maintenance of electrical equipment in sugar factory in Jamaica. 2,000 h.p. in motors and turbo-alternators. Good salary, housing.—Write, giving details of experience, stating age and whether married, Box. No. 3957, c/o Charles Barker & Sons Limited, 31 Budge Row, Cannon Street, London E.C.4. (H 604)

ELECTRICAL MECHANIC required for H.F. heating equipment construction and maintenance. Must be first-class man with sound machine-shop and bench-fitting apprenticeship.—Apply, Box No. 3057, Electrical Times. (H 580)

ELECTRICIAN, preferably single and about 30 years of age and holding the National Certificate, wanted for Melbourne, Australia. Good prospects for the right man. —Box No. 3061, Electrical Times. (H 582)

ELECTRICIANS with good contracting experience, used to Pyrotenax and armoured cable installations, for work at Port Talbot, South Wales.—Write or apply, stating experience, to W. J. Furse & Co. (Manchester) Ltd., 20 Mount Street, Manchester 2. (H 494)

EXPERIENCED STEEL-WORK PLATER required for light constructional work. Preferably with previous experience of furnace casing work. Ability to do some welding an advantage. — Apply, Box No. 3059, Electrical Times. (H 581)

FIRST-CLASS FITTERS required for interesting maintenance and development work. Preference will be given to men who have completed engineering apprenticeship, and in addition have sound machine tool construction experience.—Apply, Box No. 3053, Electrical Times. (H 578)

FERRANTI LIMITED invite applications for SENIOR APPOINTMENTS of graduate engineers with industrial experience in the design of electricity meters. The posts to be filled carry senior responsibility with excellent prospects, generous salary and pension.—Application forms from the Staff Manager, Ferranti Limited, Hollinwood. Please quote Reference M.E. (H 603)

FURNACE BRICKLAYER required. Must be really first-class man with previous experience. H.F. electric furnace work. Apply, Box No. 3055, Electrical Times. (H 579)

METER TESTER required, able to take charge of repairs and testing all types of meters.—Apply in writing, giving age, experience and wages: Electric Meter Co., Castor Road, Brixham. (H 552)

OIL Refinery Contractors require a qualified ENGINEER to be responsible for specifying and selecting all types of pumps, motors, turbines, compressors, etc., used in the refining industry. Applicants should have had past experience of such equipment, particularly application of process type centrifugal pumps in the petroleum industry.—Write fully, Foster Wheeler Ltd., 5 Ixworth Place, London S.W.3. (H 399)

POWER PLANT CHARGE ENGINEER required by major oil company for employment in the Middle East to operate a combined gas and steam turbine station where he will take charge of a shift. Applicants who should be under 30 years of age, must possess a Higher National Certificate in electrical engineering and have served an apprenticeship in the generation division of a power supply organisation undertaking power station control room operation, followed by experience as a boiler house or turbine room charge engineer. Attractive salary plus generous allowance in local currency designed to assist substantially in meeting cost of living, free passages kit allowance, free medical attention, good leave arrangements, pension scheme.—Write, stating personal particulars and details of qualifications and experience, quoting Dept. F.13.F, to Box 3336 at 191 Gresham House, E.C.2. (H 415)

QUALIFIED ELECTRICAL ENGINEER, commercial experience essential, required for responsible permanent position Pakistan. Salary approximately £1,200 p.a. and appropriate expenses. Single man aged 30 to 35 preferred. Applicants must have sound knowledge theory and practice of power, transmission and distribution. Knowledge of line communication system an advantage. The post offers good prospects with old established company.—Apply Box No. 2081, Electrical Times. (H 366)

REPRESENTATIVES, with live connections wanted by electrical wholesalers who are enlarging sales staff, for areas: Surrey and Greater London, Essex and Greater London. Salary, commission and expenses.—Write giving full details in strict confidence, to Box No. 3021, Electrical Times (H 496)

SENIOR OR INTERMEDIATE DRAUGHTSMAN required, with sound general engineering experience. Ordinary National Certificate desirable. Five-day week. Staff canteen.—Apply: Electric Furnace Co., Ltd., 161 Queens Road, Weybridge. (H 504)

TECHNICAL ASSISTANT required for commercial work with large company in south-east area, manufacturing electronic telephone equipment.—Write, stating age, qualifications and details of experience to Box No. 3045, Electrical Times. (H 560)

TRANSFORMER DRAUGHTSMEN required by Hackbridge and Hewittic Electric Co. Ltd., Walton-on-Thames, Surrey, one having experience of transformers up to 2,000 kVA, and one having experience up to 100,000 kVA. Pension scheme. Five-day week.—Write, giving age, experience and salary required to Chief Mechanical Engineer. (H 481)

TROUGHTON & YOUNG LTD., require for large industrial installation work:—DRAUGHTSMEN, SITE ENGINEERS, FOREMEN.—Write full details: Personnel Manager, Imperial Court, Basil Street, S.W.3. (H 518)

WORKS MANAGER required to take complete charge of the manufacturing side of two factories, one for Paper Insulated Cables and the other for Rubber Insulated Cables. This is an important post and only men with highest qualifications need apply.—Box No. 3049, Electrical Times. (H 567)

APPOINTMENTS WANTED

OUTSIDE SERVICE ENGINEER (39), owner-driver, lifetime experience plant, machinery, equipment, 2 year tech., 2 Govt. certs., A.I.P.R.E. Willing cover Home Counties or near. Specialist training welcomed. —90 Bensham Manor Road, North Croydon. Telephone: THO 2301. (H 466)

TWO FULLY QUALIFIED ELECTRICIANS with experience in all types of installation work in power stations, large factories and commercial establishments, at home and abroad, require progressive positions, preferably overseas.—Box No. 3017, Electrical Times. (H 479)

A. M.I.E.E. (34) seeks suitable progressive appointment abroad, preferably in Malaya, Africa or South America. Previous industrial experience abroad.—Box No. 2989, Electrical Times. (H 385)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed.—Edgware 8631 (4 lines), Service Electric Co., Ltd., Stanmore, Middx. (D 324)

ARMATURE SERVICE CO. LTD., Haddington Street, Hove (Tel. 32996), electrical engineers and winding specialists. Distance no object. (F 739)

CASTINGS, Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (H 268)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installation, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Phone: Chiswick 5105. (A 20)

QUOTATIONS for Automotive Cables as follows: 100,000 ft. 19/·0113; 150,000 ft. 19/·0142; 25,000 ft. 19/·0179; 25,000 ft. 19/·0226; all to be in coils of 100 ft.—Requested by Middendorp Electric Co. Pty. Ltd., 148 Queen Street, Melbourne C.1, Australia. (H 566)

STEEL, ALUMINIUM, BRASS and other non-ferrous sheets, strip, bars, off-cuts. Any quantity, gauge, size. Immediate payment.—Grades Sheared Metal Co., Ltd., Green Lane, Hounslow, Middlesex. Telephone: Feltham 3274. (H 368)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road London E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED.—Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED. D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 13)

WANTED, several tons B.M.S. STRIP, 16 and 18 s.w.g. x ¾ in. or over.—Antifyre Ltd., 16 Shaftesbury Road, Acton, W.3. (H 545)

WANTED—SWITCHBOARDS for 9 kVA Meadows B.T.H. 230 V alternator sets.—Offers to Box No. 3041, Electrical Times. (H 547)

WANTED TRANSFORMERS, preferably oil-cooled, new or second-hand. Primary voltage 220 or 440. Secondary with the range 12 volt to 24. Capacity within the range 5 kVA to 25 kVA.—Box No. 3047, Electrical Times. (H 563)

400, 500, 800, cycle ALTERNATORS or MOTOR GENERATORS wanted. All ratings and voltages. Quantities required.—Wilflo Products, 216 228 Gorbals Street, Glasgow C.5. (H 564)

BUSINESS OPPORTUNITIES

FREE-LANCE DESIGNER to develop series of electric wiring devices, including lighting switches, or would engage suitable individual or small working team. Knowledge of American technique an advantage. Birmingham district.—Box No. 3039, Electrical Times. (H 544)

PATENTEE of simple device with enormous sales possibilities appealing to countless users of electric light wishes to contact organisation able to undertake complete marketing of the invention on terms.—Apply to Principal, Box No. 3043, Electrical Times. (H 548)

AGENCIES

MANUFACTURERS' AGENTS ASSOCIATION, INC. (E.T.), 8 Bream's Buildings, London W.C.2, supplies free lists of Agents to Manufacturers seeking representation in important industrial centres. Membership available to established agents only. Particulars supplied. (A 7)

FOR SALE

CABLES & WIRE

CABLE drums. About 250 secondhand wooden cable drums, 31 in. to 54 in. outside diameter, in sound condition, for disposal.—Apply to Platt Metals Ltd., Metalex Works, Gt. Cambridge Road, Enfield, Middlesex. (Enfield 3425.) (H 491)

DOMESTIC APPLIANCES

COMMERCIAL IRONS for all purposes.—Donaldsons Wireless Electric Irons, 31 Sloan Street, Leith. (A 163)

IMMERSION HEATERS. Grubb 4 kW. No purchase tax. All lengths, 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed and immediate delivery. Write for illustrated brochure, latest lists and trade terms to distributors.—John Owner and Co., Ltd., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

GENERATING PLANT

BRITISH ELECTRICITY AUTHORITY

North Western Division

TENDERS are invited for the purchase and removal of the following redundant plant situated at Stuart Street Generating Station, Bradford, Manchester 11:—

1—Type M.A.S., 4-cylinder, 45 b.h.p., 960 r.p.m. Internal Combustion Petrol Engine, 12 V Battery Starting, 20-gall. tank capacity, installed 1940. Made by Parsons Engineering Co., Southampton. Engine dismantled and ready for loading.

Specification and form of tender can be obtained from the undersigned.

The authority does not bind itself to accept the highest or any offer.

Tenders to be received not later than February 21, 1951.

P. H. FLATT,
Divisional Secretary.

British Electricity House,
Wilmslow Road, East Didsbury,
Manchester 20. (H 549)

ALLEN GENERATOR for sale, 125 kW. 250 V, d.c., 500 amps., driven by 200 h.p. vertical diesel engine, compressed air starting with compressor and slate panel switchboard connections, tank. Inspect at works W. England.—F. J. Edwards, Ltd., 359 Euston Road, London N.W.1. (H 550)

DIESEL ENGINES 375 H.P. PETTER VERTICAL 6-CYLINDER COLD STARTING DIESEL ENGINE, speed 500 r.p.m., complete with 6 h.p. Diesel driven starting compressor, air receiver, water and fuel tanks, etc. This engine for all practical purposes is equal to new, having only been used as a standby.

360/400 H.P. PAXMAN VERTICAL 12-CYLINDER MARK 12 R.P.H. DIESEL ENGINES, (3 available) with cylinders 7in. dia. x 7¼in. stroke, 360 h.p. at 900 r.p.m.: 400 h.p. at 1,000 r.p.m.

25 H.P. CROSSLEY VERTICAL 6-CYLINDER COLD STARTING DIESEL ENGINE, speed 480 r.p.m. with starting compressor, air receiver, circulating pump, etc.

38 H.P. LISTER VERTICAL 4-CYLINDER DIESEL ENGINE, speed 1,000 r.p.m. 4½in. bore x 5½in. stroke, with flywheel 26in. dia., starting handle, water tank, etc.

27/34 H.P. NATIONAL VERTICAL 4-CYLINDER COLD STARTING DIESEL ENGINE 27 h.p. at 800 r.p.m.: 34 h.p. at 1,000 r.p.m., silencer, etc.

34 H.P. RUSTON VERTICAL RADIATOR-COOLED COLD STARTING DIESEL ENGINE, TYPE 3VSH, 34 h.p. at 1,500 r.p.m.: 29 h.p. at 1,300 r.p.m., air filter, extension shaft, etc.

24/36 H.P. PETTER VERTICAL DIESEL ENGINE, speed 1,000 r.p.m., 30 h.p. at 1,200 r.p.m., 36 h.p. at 1,500 r.p.m., fuel filter, air cleaner, etc.

30 H.P. TURNER VERTICAL 4-CYLINDER COLD STARTING DIESEL ENGINE, 1,300 r.p.m., 24 h.p. at 1,000 r.p.m. with radiator, fuel tank, spares, etc.

9 H.P. PETTER VERTICAL TWIN-CYLINDER DIESEL ENGINE, speed 1,500 r.p.m., complete with fuel tank, air filter, silencer, etc.

8 H.P. ARMSTRONG SIDDELEY VERTICAL SINGLE CYLINDER AIR-COOLED DIESEL ENGINE, speed 1,200 r.p.m., complete with fuel tank, pressure gauge, air filter, etc.

5 H.P. VERTICAL SINGLE-CYLINDER BY PETTER, speed 1,500 r.p.m., water cooling tank, air filter, etc.

Thos. W. Ward Ltd., Albion Works, Sheffield. Tel. 26311 (H 539)

GENERATOR FOR SALE, 220 V, d.c., 130 amps, with control panel. Driven by Tangye 34 b.h.p. single-cylinder horizontal diesel engine. Inspection at works in W. England.—F. J. Edwards, Ltd., 359 Euston Road, London N.W.1. (H 551)

LIGHTING EQUIPMENT

THERMAL FLASHERS

All Types

LAMPHOLDER, BLOCK, ETC

C and R

ELECTRICAL ACCESSORIES

42 THAMES ST., HAMPTON, MIDDX

Obtainable from all Leading Wholesalers

Telephone: Molesey 4576

(H 81p)

ARROW switches. 1,000 Arrow No. 100002 P.M. switches for sale. Brand new. Offers.—Mitchell Electric Ltd., Tennant Street, Birmingham 15. (H 465)

ENGLISH Electric H.R.C. FUSES and SLYDLOK FUSES ex stock.—Ryness Ltd., 178 Stamford Hill, London N.16. (H 475)

PURLEY CHOKES AND BALLASTS. Our 80-w. Tapped h.p.f. Ballast, with Starter Switch-holder incorporated, is proving itself the most popular unit. Suitable for most fittings, 57/6 each, subject.—F. W. Blanshard, Ltd. (Dept. ET), Purley, Surrey. Uplands 4818/9. (E 343)

METERS

A.C. and d.c. quarterly and prepayment METERS.—Electric Meter Co., Castor Road, Brixham. (H 554)

HOUSE Service METERS from 5/-. Guaranteed 2 years. —Electric Meter Co,. Castor Road, Brixham. (H 555)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

METERS, a.c. and d.c., new and reconditioned, all types. Quarterly; single- and three-phase; 3- and 4-wire; 2½ to 1,000 amp; prepayment, single and double tariff; single, dual and triple coin; fixed and variable tariff; 2½ to 50 amp. M.D.I. Billiard Switches, Rent Collectors. Prices from 5/-, carriage paid. Two-year guarantee. Immediate delivery. Illustrated catalogue from The Electric Meter Co., Castor Road, Brixham, Devon. (H 553)

MOTORS & STARTERS

A.A. ELECTRICAL CO.—FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

A.C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8631/4. (A 476)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7232. (A 12)

A.C. and D.C. MOTORS, all sizes, large stocks, fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22 (Forest Hill 2278-9). (A 10)

FOR ELECTRIC MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.

STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC

Any voltage, new, short delivery, all types of revolving electrical power.

ELECTROPOWER COMPANY LIMITED

Kingsbury Works, Kingsbury Road, London N.W.9.
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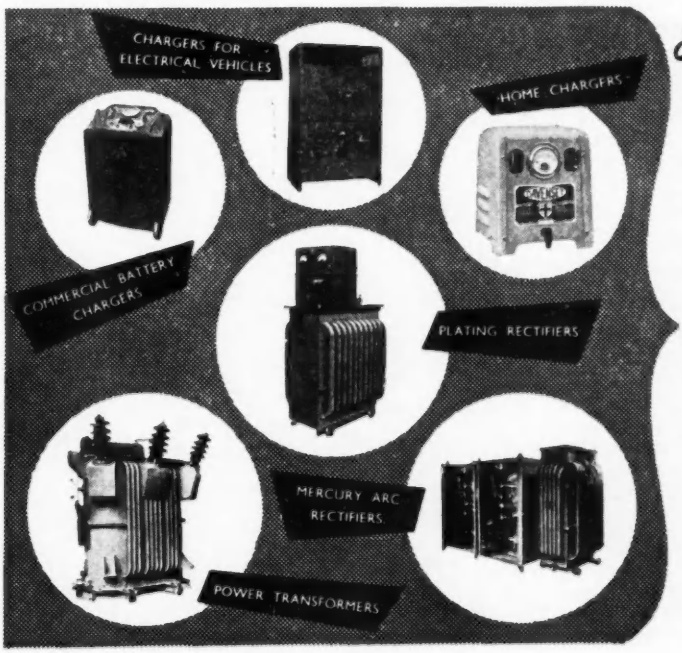

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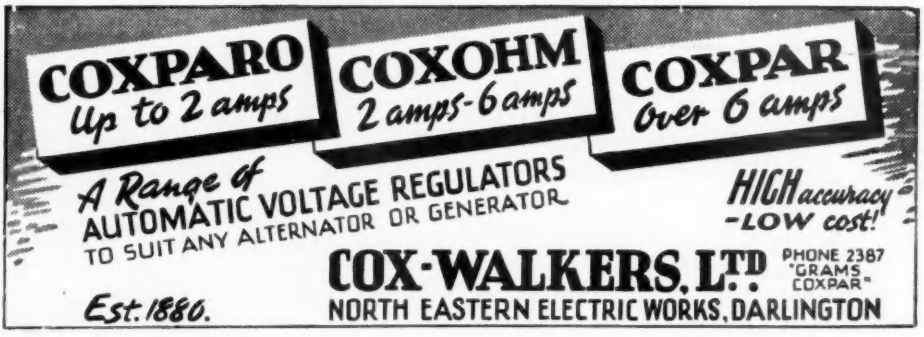

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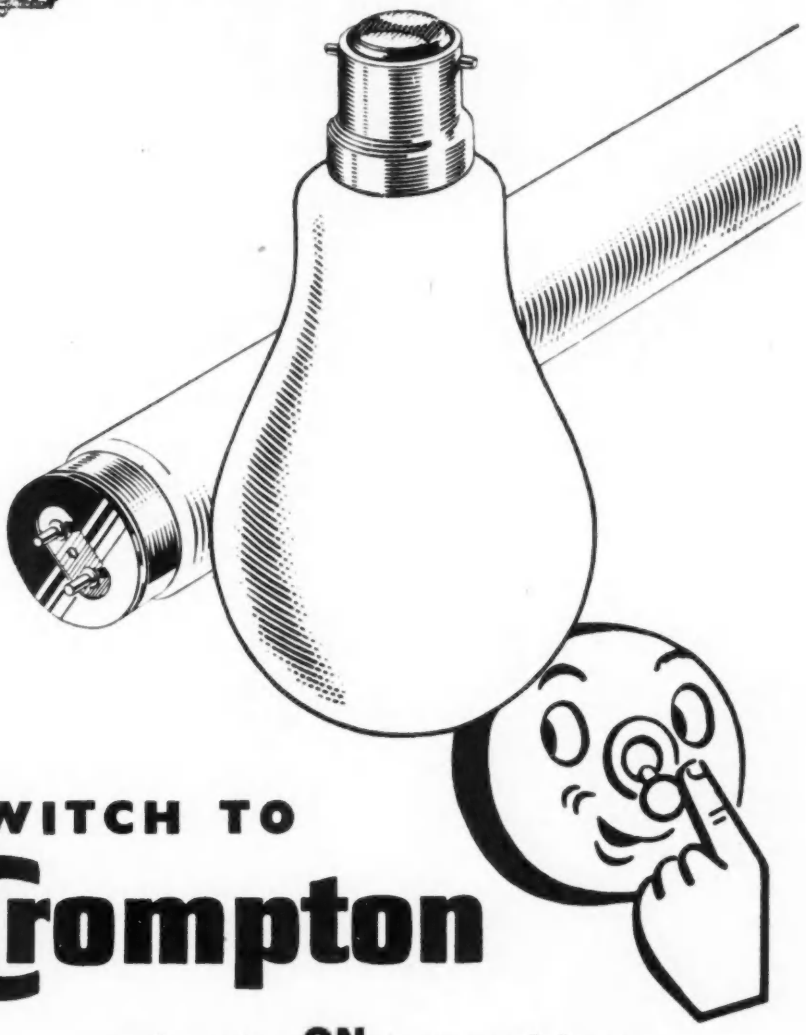

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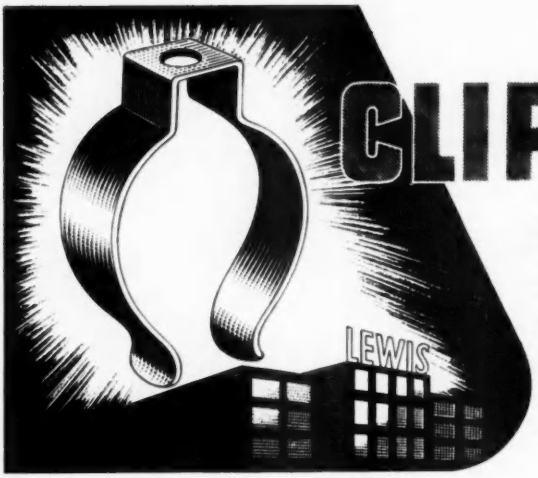

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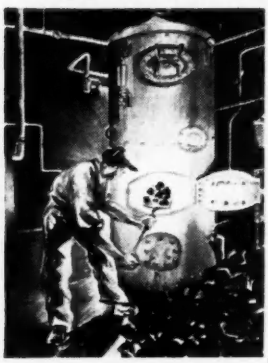

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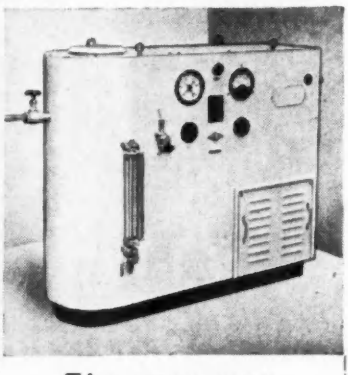

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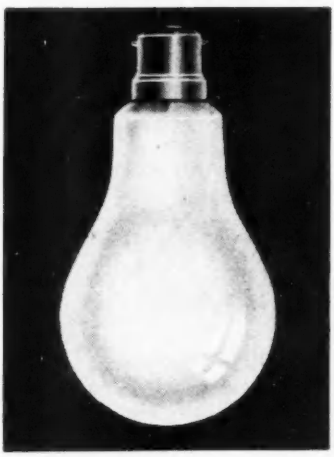

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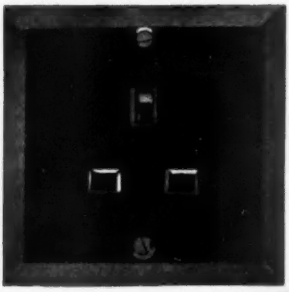

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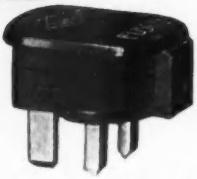

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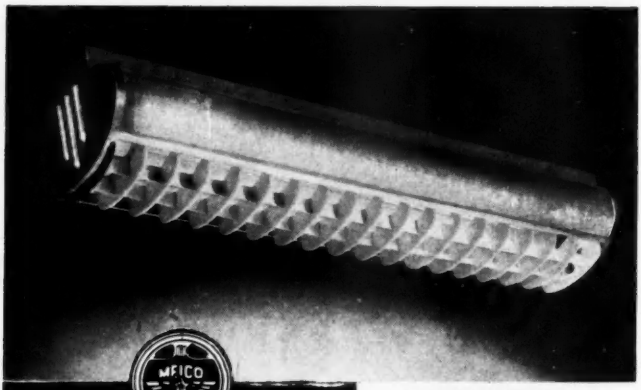

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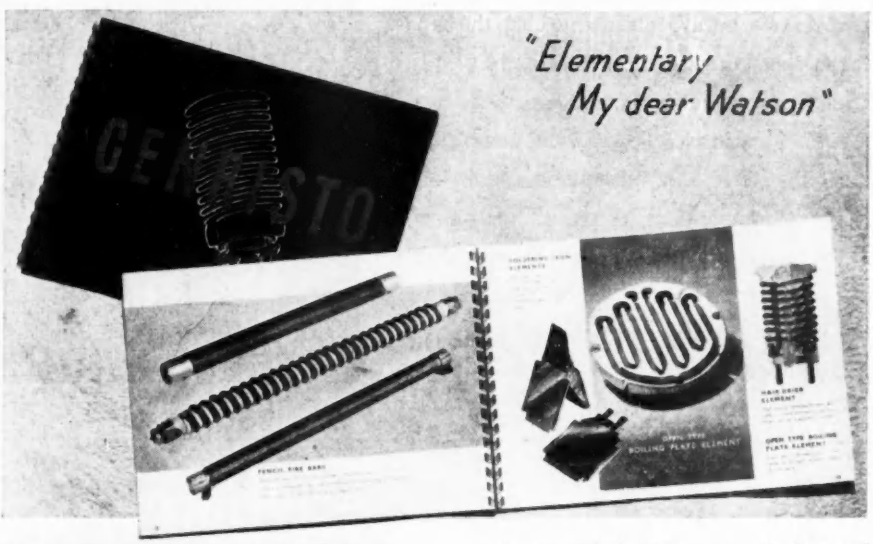

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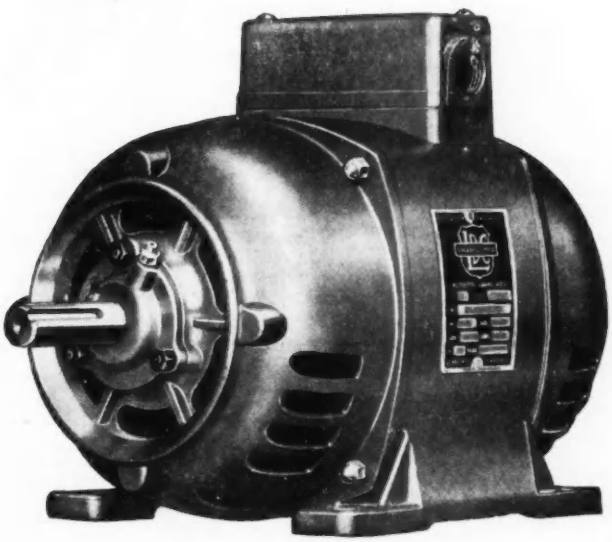

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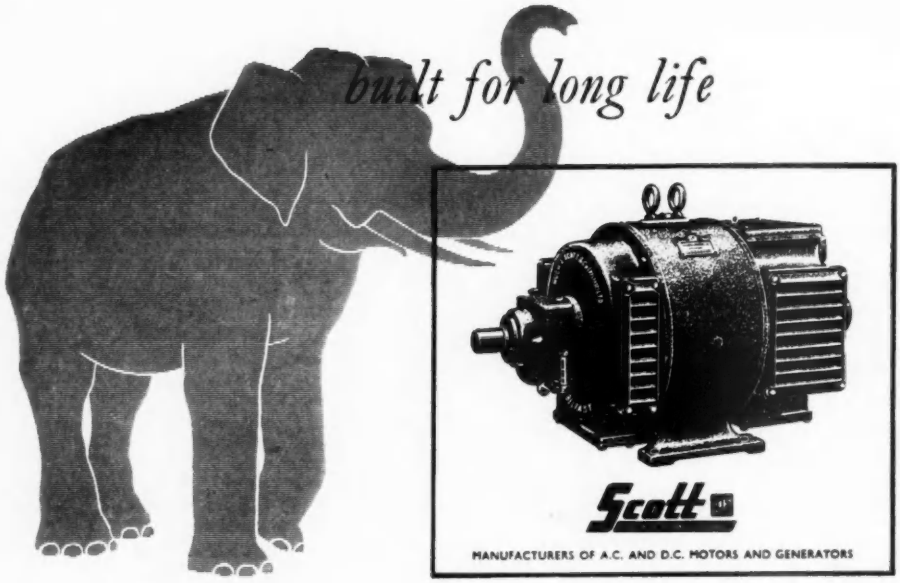

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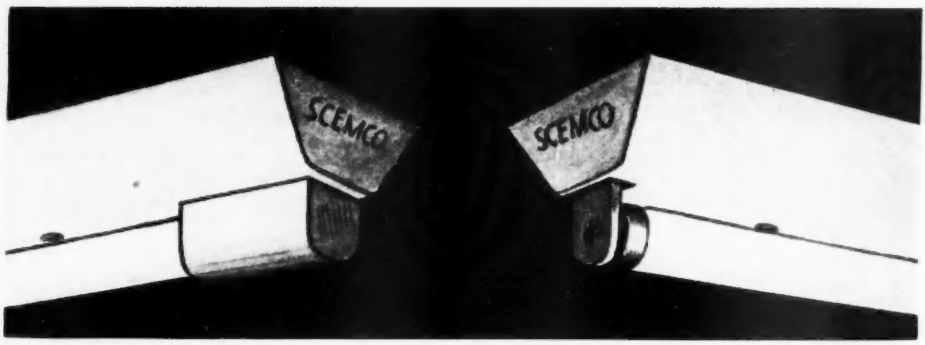

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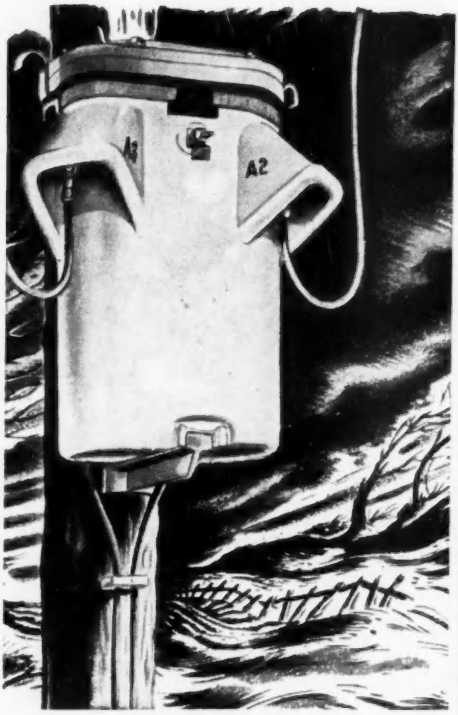

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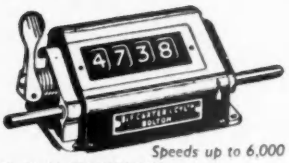

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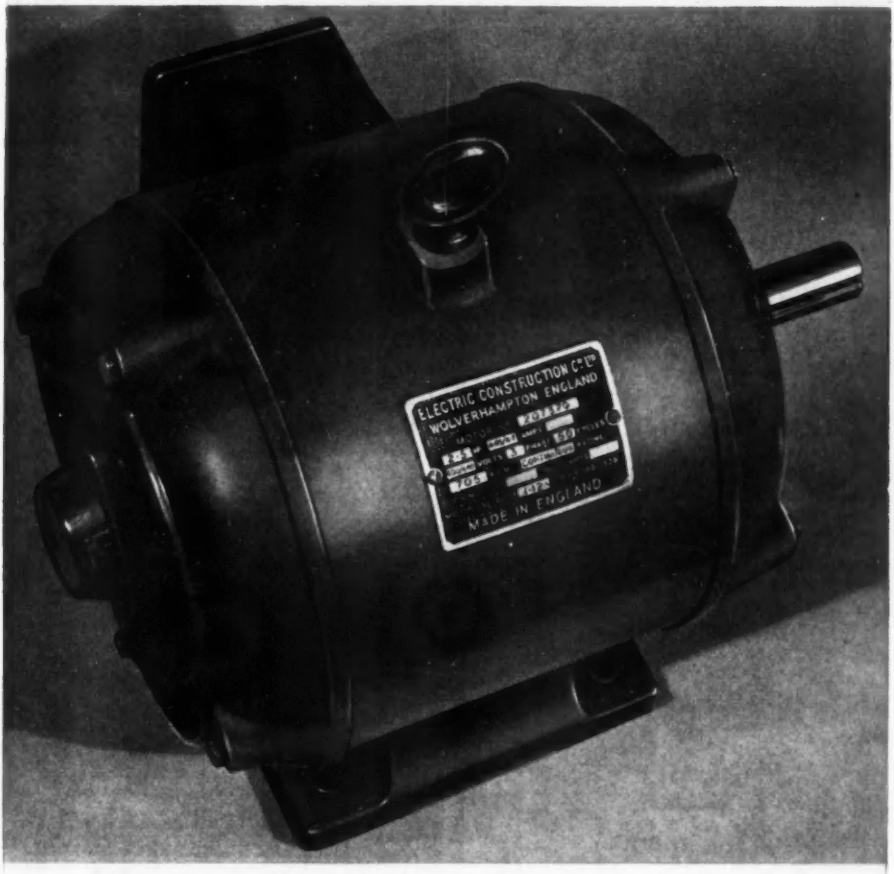

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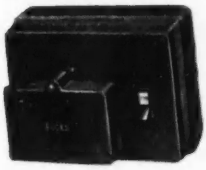

4 WAY

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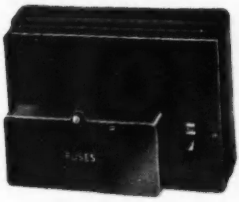

6 WAY

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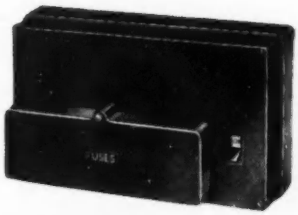

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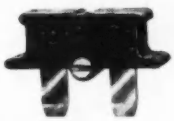

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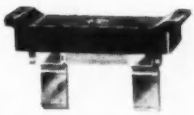

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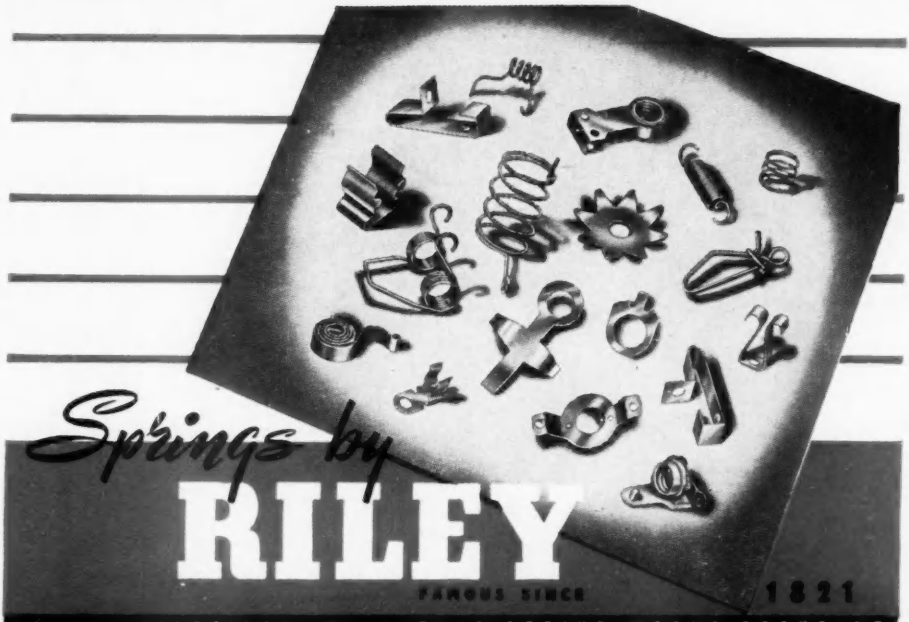

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